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## NATURE OF THE PROBLEM

Breast cancer is a major source of morbidity and mortality in women. Black women, impoverished women, and older women are at higher risk of dying from breast cancer than white, upper income, younger women.<sup>1-7</sup> Elderly and disadvantaged women have been hard to reach<sup>8</sup> and the decrease in survival is mainly due to late-stage diagnosis<sup>9-11</sup>. Morbidity and mortality in poor and minority women may be reduced by lowering the risk factors for breast cancer and encouraging early detection, diagnosis, and treatment. Lifestyle changes will be required for the primary and secondary prevention of breast cancer.

Lack of adherence to clinical and preventive regimes is a serious problem in medicine and public health<sup>12-13</sup>. Adherence, defined as the extent to which an individual's behavior meets the goals of a treatment or prevention plan, has been the subject of extensive behavioral science research<sup>14-15</sup>. As a result, a number of theoretical models have been developed and evaluated, in an effort to understand and encourage adherence to health regimes<sup>12-24</sup>. The concept of barriers or obstacles to adherence, conditions that impede or block an individual's efforts to follow a treatment plan, is included in most theoretical models<sup>15,22</sup>. Many empirical studies have investigated barriers to adherence using a variety of methods<sup>25-31</sup>. However, there has been little systematic effort to develop and validate a general methodology for identifying, describing, assessing, and overcoming barriers to adherence. The purpose of the proposed research is to use a systematic methodology to identify, describe, measure, and characterize the barriers to primary and secondary prevention of breast cancer in African American women.

## BACKGROUND OF PREVIOUS WORK

### *Risk Factors for Breast Cancer*

#### **Primary Prevention**

Although known risk factors may explain 40% to 50% of breast cancer cases, the NCI estimates that the etiology of the remaining 50% to 60% of cases is undetermined<sup>32</sup>. Studies of potential risk factors, though voluminous, are far from conclusive. There are, however, several established risk factors and other variables that could be termed likely risk factors.

A woman's risk of breast cancer increases steadily with age. Besides age, several known risk factors are associated with breast cancer: early menarche, late age of first full-term pregnancy, late age of menopause, single marital status, and family history of breast cancer<sup>33-36</sup>. Additional risk factors for breast cancer include history of cancer in one

breast, primary cancer in the ovary or endometrium, and exposure to ionizing radiation<sup>33-35</sup>

Since age, menarche, family history, and previous history of cancer are not controllable risk factors, scientists have looked for risk factors that can be modified. The primary candidates for modifiable risk factors are dietary fat intake, intake of fruits, vegetables and fiber, alcohol consumption, and obesity<sup>32</sup>. Fat intake and the consumption of fruits, vegetables, and fiber are briefly reviewed.

*Dietary fat.* A significant amount of epidemiologic and experimental research has focused on the associations between fat and breast cancer risk, with a special emphasis on total dietary fat and type of fat. Data indicate that dietary fat is associated with postmenopausal but not premenopausal breast cancer.

*Total fat.* Epidemiologic evidence from international, migrant, and time-trend studies provides strong support for a direct association between total dietary fat and risk of breast cancer<sup>38</sup>. International correlation data show a 5.5-fold increase in breast cancer incidence in countries with the highest fat intake (45% of calories as fat) compared with countries with the lowest fat intake (15 % of calories as fat)<sup>39</sup>. The association of total fat intake and breast cancer risk remains even after adjustment for total energy intake. Case and cohort studies that examined the association of breast cancer risk and total fat intake have reported mixed results. For example, a combined analysis of 12 case-control studies showed a strong positive association between breast cancer risk and both total fat and saturated fat consumption in postmenopausal-but not premenopausal women<sup>40</sup>. The Nurses Health Study, a cohort study that included about 90,000 women, found no association between breast cancer incidence or mortality and total fat, saturated fat, linoleic acid, or cholesterol after 4 years or 8 years in premenopausal or postmenopausal women<sup>41-42</sup>. Of the four other cohort studies that investigated the relationship between total fat intake and breast cancer risk, two studies reported relative risks (RR) of 1.35 and 1.38 for highest compared with lowest quartile of total fat intake; similarly, one study that compared tertiles of fat intake reported an RR of 1.7<sup>43</sup>. These three studies provide some evidence to support a positive association between fat intake and breast cancer risk. Data from the fourth study, an analysis of data from the first National Health and Nutrition Examination Survey (NHANES 1) did not support the association (RR = 0.47); however, with only 99 cases, this study had low power to detect differences<sup>44</sup>. These results indicate that the postulated association between fat intake and breast cancer risk may be difficult to determine accurately in epidemiologic studies due to limitations in the research methods, including the difficulty of detecting a modest association. Data from these cohort studies do not rule out the possibilities that fat intake earlier in life or at substantially lower intake levels could be more strongly associated with breast cancer risk. In addition, cohort studies of populations that are relatively homogeneous in fat intake -as compared with wide international dietary fat variations - could fail to detect a dietary fat-breast cancer association. What is clear, however, is that even a modest reduction in risk of 10% could reduce the annual incidence of breast cancer in the United States by approximately 18,000<sup>45-46</sup>.

Type of fat. The type of fat consumed may also be important in breast cancer development. The degree of saturation of vegetable oils has been reported to influence breast cancer risk<sup>47-48</sup>. International comparisons indicate that polyunsaturated fats, high in omega-6 fatty acids (primarily linoleic acid), and saturated fats have a strong positive association with breast cancer<sup>47</sup>. In countries such as Greece, however, where large quantities of olive oil - which is high in the monounsaturated fatty acid, oleic acid, and low in omega-6 fatty acids - are consumed, the breast cancer risk is reduced. Data also indicate that consumption of polyunsaturated omega-3 fatty acids such as eicosapentanoic and docosahexanoic acids, found primarily in certain fish oils, is not associated with increased risk and may even protect against cancer, including breast cancer<sup>49</sup>. The effect of the type of fat consumed on breast cancer risk is particularly important because while trying to reduce saturated fat and cholesterol intake - risk factors for cardiovascular disease - American women appear to be consuming greater amounts of oils, including those high in omega-6 fatty acids. For example, between 1959 and 1982 in the United States, the daily per capita saturated fat intake remained constant (55 g), but the linoleic acid intake increased by 73% (15 g to 26 g)<sup>50</sup>.

The fact that intakes of both saturated fat and polyunsaturated fat have been positively associated with breast cancer risk in international correlation studies, but not consistently in case-control and cohort studies, may be due partly to methodological bias<sup>51</sup>. Substantial measurement error is associated with the dietary recall assessment methods used in large population studies. For example, a 24-hour recall does not adequately represent components of the diet. Also, it should be noted that in dietary recall surveys, respondents may be more likely to remember obvious sources of saturated fat - such as meats and dairy products - than less visible sources of polyunsaturated fats - such as baked products and snack foods<sup>52</sup>. If unsaturated fat is a contributing factor to cancer risk, as may be true for breast cancer, the relationship may be harder to document than that for saturated fat, which has been consistently associated with risk of colorectal cancer in correlational, case-control, and cohort studies<sup>53</sup>.

Level of fat. The relatively homogeneous high-fat diets reportedly consumed in most cohort studies, as compared with the wider ranges of fat intake observed internationally, exemplify a methodological limitation of analytic epidemiologic studies. It may be possible to discern the relationship of dietary fat to colorectal cancer incidence when studying quintiles of fat intake from a low of 32% to a high of 44%, as Willett and colleagues<sup>54</sup> have done, if the correlation between dietary fat and colorectal cancer is strong within this dietary range. However, if a broader range of intake is needed to discern whether a correlation exists between fat and breast cancer, it may not be evident in studies such as this one. Prentice et al.<sup>39</sup> pointed out that for such a small range of fat intake, only a 15% gradient in breast cancer incidence across quintiles could be expected, too small a change to be detected with high probability. It may take a much broader gradient, involving much lower levels of fat intake, possibly 20% to 25% of calories, or even lower, to achieve a measurable reduction in breast cancer incidence.

Effect of age. Fat intake appears to be associated with colorectal cancer incidence at any age but with breast cancer only after age 50, primarily in postmenopausal women<sup>40</sup>. Nevertheless, diets at any age could be contributing factors to both of these cancers. If dietary fat early in life - for example, during adolescence - exerts a major influence on breast cancer, analysis of diets in adult women may not be relevant<sup>44</sup>. The most likely situation is that both childhood and adult diets impact breast cancer risk at a later age.

Mechanisms. The potential mechanisms that dietary fat may play a role in the enhancement of mammary tumor development include: inhibiting effects on immune system activity; increased prostaglandin synthesis, which may affect cell proliferation; increased levels of certain lipid peroxy radicals and/or oxygen radicals, possible activators of cell proliferation; enhanced cell membrane fluidity, associated with increased cell division; inhibition of the passage of low molecular weight, possibly growth regulatory molecules through membrane structures; increased levels of sex steroid hormones, believed to play a role in breast cancer development; and enhanced hormone-induced mammary gland growth responsiveness<sup>56</sup>.

Vegetables, fruits, and fiber. Epidemiologic studies suggest that the risk of certain cancers, including breast cancer, may be lowered by increased intake of dietary fiber and other dietary constituents associated with high intakes of vegetables, fruits, and whole grains. In a review of seven case-control studies<sup>39</sup>, an inverse association between breast cancer risk and consumption of fiber and fiber-rich foods was found in six studies. In five of these studies, the relationship between fiber and vegetable consumption and breast cancer was stronger than the association with fat intake. Fiber may assist in preventing breast cancer by lowering circulating levels of estrogen. Several studies examining the connection between diet and systemic sex hormones patterns in women indicated that high total fiber intake and high intake of vegetable fiber, grain fiber, and fiber from fruits and berries were associated with low levels of testosterone, estrone, and androstenedione<sup>57</sup>. Overall, reduction in the bioavailability of these hormones suggest that a fiber-enriched diet could reduce the risk of hormone-dependent cancer<sup>58</sup>. It often is not possible, however, to separate the cancer-protective contributions of fiber from contributions of other potentially protective naturally occurring nutritive and nonnutritive constituents of foods. In a combined analysis of 12 case-control studies, Howe and colleagues<sup>39</sup> found statistically significant inverse associations between fiber, vitamin A, β-carotene, and vitamin C, all markers of vegetable and fruit intake, and breast cancer risk in postmenopausal women.

Dietary Risk Factors in African American Women. There is a large body of epidemiological research linking the consumption of high fat diets with increased risk of chronic illness<sup>59-60</sup>. High fat diets have been linked to an increased risk of heart disease, breast cancer, prostate cancer, colon cancer, and adult onset diabetes<sup>60</sup>. The Healthy People 2000 goals include a reduction in dietary fat intake to 30% of calories from fat<sup>60</sup>. There is some evidence that people would benefit from even more dramatic reductions in their fat intake<sup>61</sup>. The National Cancer Institute (NCI), estimated that "...at a minimum, 30,000 lives could be saved by the year 2,000 if Americans would modify their dietary

habits" <sup>62</sup>. Recent reports indicate that black Americans have a high burden for cancers of the breast, colon, and prostate <sup>63</sup>, and preferentially select high fat, low fiber diets <sup>63</sup>. When compared with whites, black Americans (cumulative to age 70 years, 1979-81 data), suffered 8,118 excess deaths from cancer <sup>64</sup>. Additionally, they suffered 20,335 excess deaths from other chronic diseases (heart disease/stroke, diabetes) for which dietary guidelines also emphasize low-fat/high-fiber intakes <sup>64</sup>.

While the public seems to be generally aware of the need to reduce fat intake, surveillance data suggest that only modest declines in fat intake have occurred over the past 20 years and that considerable change will have to occur if the Healthy People 2000 goals are to be met <sup>61,65</sup>. The problem of reducing fat intake in the American population in general, and in African Americans in particular, is a matter of getting large numbers of people to make a permanent commitment to changing their eating habits<sup>66</sup>. Considerable research on eating behavior suggests that getting people to make permanent changes will be difficult and may require much stronger measures than educational campaigns <sup>59, 67-69</sup>.

## **Secondary Prevention**

Secondary prevention of breast cancer involves influencing women to engage in effective screening, detection and treatment-seeking behaviors. Breast self-examination is a low-cost method for the early detection of breast cancer, yet as many as 30% of women never perform breast self-examinations. Older women who are at highest risk are less likely to perform breast self-examinations<sup>72</sup>. In addition to breast self-examination, clinical examinations by health professionals can also be useful in the early detection of breast cancer<sup>73</sup>. Mammography has been shown to reduce breast cancer mortality in women between 50 and 70 years of age, although its use in women under 50 has been questioned<sup>73</sup>. Finally, the extent to which a woman seeks immediate medical care or delays after identifying a potential change in breast tissue can affect cancer mortality risk. Some studies suggest that African American women, especially those with low income and education, may be less likely to engage in effective breast self-examination, seek mammogram screening, or seek treatment after detecting symptoms<sup>74-76</sup>.

## **Barriers to Breast Cancer Prevention**

Based on our review of the literature, we would like to focus on the following behaviors as likely risk factors for breast cancer: 1) dietary fat intake; and 2) intake of fiber, fruits, and vegetables. It is well established that these are difficult behaviors to change <sup>55,66</sup>. The question of interest to us is why is it so difficult for people to change these behaviors, what are the barriers or obstacles that impede adopting healthier lifestyles?

A theoretical framework is valuable in guiding research on barriers to behavior change <sup>78-79</sup>. The Transtheoretical Model of Behavior Change has been extensively applied to many health behaviors but has only recently been applied to nutrition<sup>80-87</sup>. This model describes five stages people must pass through in making permanent behavior

changes: precontemplation - no intention to change, contemplation - seriously considering change, preparation - taking steps to change, action - actively involved in meaningful change, and maintenance - maintaining meaningful change<sup>80</sup>. We propose to use this model to structure our investigation of adherence to cancer prevention behaviors.

Barriers to lifestyle change that have been studied include emotional factors<sup>88</sup>, environmental situations<sup>89-90</sup>, availability of healthy foods<sup>91-92</sup>, cultural influences<sup>92</sup>, television advertising<sup>93</sup>, age, occupation and income<sup>94-95</sup>, health beliefs<sup>17-18</sup>, attitudes<sup>19</sup>, self-efficacy<sup>14</sup>, high-risk situations<sup>89-90</sup>, social support<sup>14</sup>, and patient-provider communications<sup>15</sup>.

The secondary prevention behaviors we will focus on are: 1) breast self-examination, and 2) mammography. Barriers to secondary prevention include factors such as lack of knowledge<sup>86</sup>, access to service<sup>95-97</sup>, availability of service<sup>98-99</sup>, economic constraints<sup>98</sup>, physical and attitudinal problems<sup>98</sup>, a decline in coping skills, and lack of physicians' compliance<sup>95-96,100</sup>. Poor women have other urgent life priorities, lack resources, are less educated, and have not had a tradition of health prevention practices<sup>101-103</sup>.

There are still some basic theoretical and methodological questions that remain unanswered about barriers to adherence. What are the basic units of analysis for studying adherence? What important classes of variables must be considered? Are some variables more important than others? How can we operationalize and measure these variables for research purposes? Can we develop empirical methods for determining which barriers are most important in accounting for the variability in adherence over time and across situations and behaviors? Are there important individual differences in the types of obstacles that cause adherence problems? Finally, if we solve some of these conceptual and research problems, how do we translate this knowledge into improved interventions and public healthy policy?

Making and maintaining lifestyle changes involve several key components: knowledge, motivation, skill, problem solving, and persistence<sup>90</sup>. Exactly how each process is involved depends upon the behavior to be changed and on the individual's stage of change for that behavior. The maintenance of changes also involves knowledge, motivation, skill, and problem solving that differs from that which is required to initially make changes.

When disease prevention is understood as the persistent choice of healthy behaviors in the context of a person's every day life, it becomes easier to understand why people find it so difficult to make and maintain lifestyle changes. There are many cognitive, emotional, environmental, and interpersonal events that function to punish healthy behaviors and reward unhealthy behaviors. Much theoretical and empirical work has been done on the problem of patient adherence, but there remains a clear need for the development of new methodologies that will lead to practical results.

## PURPOSE OF PRESENT WORK

### ***Purpose***

Our research objective is to systematically apply the concept of barriers to adherence to breast cancer prevention in African American Women. We propose to identify, describe, and classify the obstacles or barriers that prevent African American women from making lifestyle changes that would result in primary or secondary cancer prevention. We will develop an instrument to measure the degree to which an individual faces different obstacles, then describe the prevalence of these barriers in a pilot study of women in Nashville, Tennessee.

### ***Technical Objectives***

1. To identify and describe the barriers to changing the following behaviors for African American women.
  - A. Reducing dietary fat intake.
  - B. Increasing consumption of fruits and vegetables.
  - C. Performing breast self-examinations.
  - D. Obtaining breast cancer screening by mammogram.
2. To develop a quantitative assessment tool to measure the presence of each barrier to making primary and secondary prevention behavior changes for a particular individual.
3. To use this tool to establish preliminary norms in an urban, southern, African American community.
4. To investigate individual differences in obstacles to behavior change, and differences between low and middle income black and white women.

## METHODOLOGICAL APPROACH

### ***A Proposed Methodology to Overcome Barriers to Behavior Change***

Given the need to investigate barriers to lifestyle change for specific behaviors in different populations, a general methodology for conducting such research is needed. While there has been considerable methodological work in the area of health promotion planning, the methods for identifying barriers to adherence have not been adequately developed. Based on research by Schlundt and colleagues<sup>104-112</sup>, we propose a general model of research and development that can be followed to identify, measure, describe, and overcome barriers to changing behavior in a particular target population:

1. Selection of the population, the health problem, and the behavioral risks.
2. Literature review of current knowledge, both general and population specific.
3. Use of qualitative research methods to identify and describe:
  - a. specific behavior changes required
  - b. barriers to making changes
  - c. critical situations in which decision making concerning risky behaviors occurs
4. Systematic analysis and summary of qualitative data: Identification and classification of change targets and the obstacles to making these changes
5. Development and validation of measurement tools for quantifying obstacles to change
6. Population-based quantitative survey's of obstacles to change
7. Investigation of individual and subgroup differences
8. Development and evaluation of intervention programs that specifically address the commonly encountered obstacles to change and that are appropriately tailored to meet individual and cultural differences in intervention needs.

### ***Overview of Project Design***

The methodology of this project is guided by the systematic methodology for overcoming adherence obstacles described above. Specifically, we will be focusing on steps two through seven in this project. This work will be conducted in four phases.

*Phase I* will use semi-structured interviews with 200 African American women to identify and describe barriers to breast cancer prevention. We will systematically analyze this information and develop a taxonomy of barriers to breast cancer prevention.

*Phase II* will involve the development of a measurement tool, The Obstacles to Breast Cancer Prevention Questionnaire, and an evaluation of its psychometric properties using African American women.

*Phase III* uses telephone interviews with randomly selected women from the Nashville community to describe the prevalence of barriers to breast cancer prevention. Because race and income are often confounded, our research will explicitly make comparisons among black and white subjects, and among lower income below Nashville median income and higher income above Nashville median income subjects in Phase III. This approach will allow us to draw conclusions about barriers that are unique to African American women versus barriers that are a function of socioeconomic status and barriers that are common to all women.

*Phase IV* will pool the questionnaire data from phases II and III and use hierarchical cluster analysis to look at patterns of individual differences in obstacles to cancer prevention.

### **Expected Results**

1. For each of two primary and two secondary prevention behaviors for breast cancer, we will empirically develop a list of barriers that prevent or impede the adoption of these behaviors by African American low and middle income women.
2. For each of the behaviors, we will develop a questionnaire that measures the presence of each type or category of barrier, and we will evaluate the psychometric properties of these questionnaires.
3. In a sample of white and African American women drawn from the Nashville community, we will document the prevalence of the barriers to primary and secondary breast cancer prevention. We will be able to describe those barriers that are unique to African American women, those that are unique to low income women, and those that are common to all women.
4. We will also describe patterns of individual differences in barriers to primary and secondary breast cancer prevention.
5. We expect that the results of this research will provide a rational and empirical basis for the development and planning of community and clinical breast cancer prevention programs.

## **RESULTS**

The results described in this first Annual Report cover Phase I and include some start-up activities under Phase II. The steps of the proposed methodology are used as a guide for the report of progress.

### ***Literature Review of Current Knowledge.***

An extensive literature review on Primary Prevention has been completed and is attached in Appendix A. This review forms the beginning of a manuscript that will be submitted for publication. Similarly, an extensive literature review and manuscript are in progress for Secondary Prevention.

Selected excerpts applicable to Primary and Secondary Prevention are provided below to feature key points gleaned from the literature.

### ***Summary of Review: Primary Prevention***

Three major areas of information are featured in the review:

1. The need to understand eating as a basic yet complex behavior;
2. The gains made in understanding the process of behavior change through various theoretical models;
3. The proposal for a comprehensive model to understand eating behavior and eating behavior change.

These areas are elaborated upon briefly below.

#### **Understanding Eating as a Behavior**

While there is considerable agreement on the need to decrease fat intake and increase the consumption of fruits and vegetables, there is little consensus on how to accomplish these goals. The traditional approach has been to assume that a well-informed public will adopt healthy practices. There is ample evidence that Americans understand the need to eat less fat and eat more fruits and vegetables, while at the same time there is evidence that little change has actually been made<sup>113</sup>.

At least one part of the problem is an inadequate understanding of eating as a behavior that is complex, multiply determined, culturally conditioned, and inherently variable<sup>114</sup>. There are many factors that intervene between the knowledge of what constitutes good nutrition and the foods an individual consumes from one day to the next.

Eating, being essential to the survival of all animals, is one of the most fundamental activities of the human being. It is therefore not surprising that the act of ingesting food has come to have multiple layers of personal and cultural meaning, and that this act, because of its daily frequency, must be totally integrated into the matrix of daily activities of the individual, the family, and the community<sup>115-116</sup>. Because eating is such a complicated behavior, it makes little sense to discuss the reduction of dietary fat or the increase of fruit and vegetable consumption as though these were things people could easily decide to do. People don't consume fat or eat fruits and vegetables, people eat meals and snacks several times a day in a variety of social and environmental situations.

#### **The Process of Behavior Change**

An understanding of how people make and maintain changes in complex, real-world behaviors is necessary in order to develop intervention strategies that have a good chance of changing food intake and reducing chronic disease risk. At the present time, our understanding of this process consists of a number of theoretical models; such as 1) The Health Belief Model; 2) The Theory of Reasoned Action; 3) Transtheoretical Model

of Behavior Change and, 4) The Relapse Prevention Model. These are described further in the detailed literature review attached in Appendix A.

Common to all of these theoretical perspectives is the idea that certain situations delay, impede, or prevent people from contemplating, making, and maintaining behavior changes. While the terminology differs from one theoretical perspective to the next, the underlying theme is similar. The terms barriers to behavior change, or obstacles to behavior change have come to be commonly used to describe these situational factors that transform the intention to act in a certain way into the occurrence of a different and often incompatible behavior<sup>117-118</sup>.

Not only is eating a complex behavior, but changing eating is a dynamic process that is influenced by many biological, psychological, interpersonal, and environmental variables. To induce wide spread changes in people's food intake in order to reduce the risk of chronic disease, it will be necessary to have a more complete understanding of the complexity of eating and the process of making and maintaining changes in eating. The task is partly descriptive in that it will be necessary to identify and describe the many different variables that can influence food intake and changes in food intake. This task is also partly theoretical in that it will require an expansion of existing theoretical models to encompass the full range of relevant findings. In fact, there is a constant interplay between observation and theory since theory guides what we look for and measure, while the findings of these studies lead us to modify our theories.

### **A Biological-Cognitive-Environmental Approach to Understanding Eating Behavior**

First, we will articulate a theoretical model of eating behavior that has great heuristic value for organizing the literature and guiding observations. Then, we will examine the empirical literature on food intake and adherence to dietary recommendations to demonstrate that the variables identified by the theoretical model are important.

The theoretical model is based on the perspective developed by Schlundt and Johnson<sup>90</sup>. The approach begins with a social learning theory understanding that behaviors are influenced and controlled by environmental antecedents and consequences<sup>119-120</sup>. The individual is conceived of as a real-time information processing system that behaves in a way that will maximize reward and minimize punishment, given a set of perceived circumstances. The person brings into the situation cognitive schemata, as well as organized sets of ideas and beliefs that are used to perceive and understand the immediate situation. These schemata provide the individual with instructions for setting goals, understanding events, interpreting situations, and anticipating the consequences of various actions. These cognitive schemata also tell the individual what he or she is capable of doing along with memories of how similar situations have turned out in the past. The individual does not passively respond to stimuli. Rather, people are able to plan and undertake actions that allow them to achieve short-term and long-term goals<sup>121</sup>.

Three categories of antecedents and consequences are considered in detail in the model. Antecedents and consequences can be physiological, environmental, and cognitive-behavioral. Eating behavior occurs in the context of personal cognitive schemata, physiological pressures influencing appetite and satiety, and a complex cultural environment. The cognitive behavioral components consist of thoughts, actions, and emotions. Theoretically, we are viewing each act of eating behavior as the end product of multiple, interacting causal factors. The advice to follow a healthy diet is only one of many factors that comes into play when a person is deciding whether or what to eat. Given this understanding of how food intake is regulated, it is not surprising at all that adherence to dietary recommendations is rather poor. Obstacles to dietary adherence can be understood from this theoretical perspective as antecedents or consequences that reduce the probability of following dietary recommendations or that increase the probability of incompatible selections. These obstacles operate differently depending upon the specifics of the situation in which eating behavior is occurring.

Figure 1 presents an overview of the model along with the specific variables that guide our literature review.

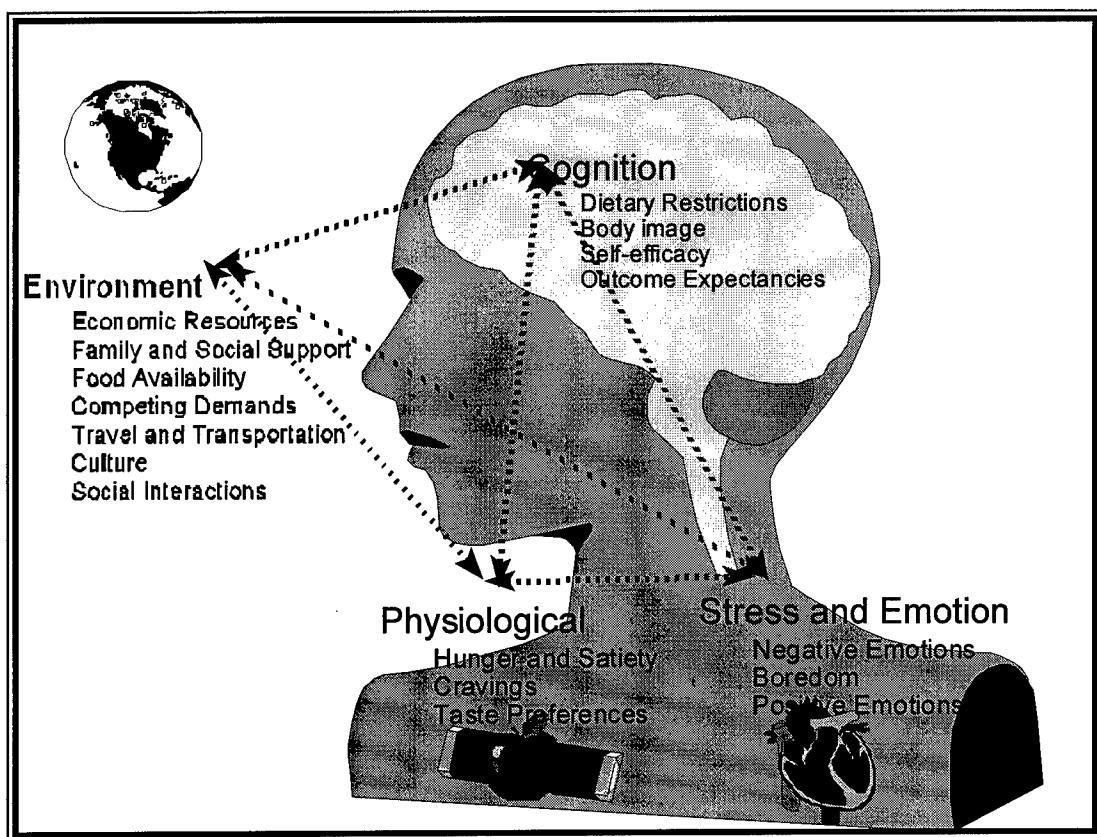


Figure 1. A biological-cognitive-environmental model.

The individual is represented in the center of the figure and consists of three major components. The cognitive element has four parts: dietary restrictions, body image, self-efficacy, and outcome expectancies. Stress and emotions are also a part of the individual and have the three elements of negative emotions, boredom, and positive emotions. The individual's physiology will be understood in terms of three components: hunger/satiety, food cravings, and taste preferences. The environment, that which is in the world outside of the individual, is represented by six components: economic resources, family and social support, food availability, competing demands, culture, and social interactions.

In Figure 1, lines connect each component with every other component to indicate that all these variables interact to produce eating behavior. Together, these components - the individual living in an environment - form a system that controls and influences food intake. As with any other system, a change in one component can affect other components and ultimately change the overall behavior of the system.

In summary, we have described a theoretical approach to the regulation of food intake that will allow us to better understand how and why people have such a difficult time making long-term changes in their eating behaviors. Eating behavior is controlled by antecedent and consequent events that occur both within the individual and outside of the individual in the environment. Any particular episode of eating has to be understood in terms of how all of these variables potentially interact in order to influence the choice of what and how much to eat.

In the following sections, we present a summary of our literature which shows that each of the variables we have identified has been demonstrated to have an effect on eating behavior, and that variables within this domain are aptly considered obstacles to dietary adherence. In developing this literature review, we have drawn on a very diverse set of studies. We examined not only studies that were explicitly focused on obstacles to adherence, but also basic research on the regulation of food intake, work on weight reduction in obesity, and studies of overeating and binge eating.

### **Obstacles to Dietary Change**

***Personal Variables.*** The literature on eating behavior, eating behavior change, eating disturbances, and dietary compliance supports the conclusion that there are several important sets of personal variables that influence the likelihood that someone will make and maintain healthy changes in eating behaviors (see Table 1). Emotional reactions, particularly negative emotions, disrupt dietary adherence for some people.

Physiologically, people are influenced by hunger, specific food cravings, and by strong taste preferences, particularly for foods containing fats and sugars. When people begin to restrain their intake of food as a cognitive decision, the result may be positive or it may result in a very unstable pattern of dieting and overeating. A dislike of the size or shape or one's body is an important motivational factor for many individuals, but especially for females. A poor body image, however, is also linked with numerous problems in eating,

including eating disorders. Self-efficacy, the confidence that one can successfully make changes in eating behaviors, is an important variable in separating those who will adhere to changes and those who will not.

Most of the evidence linking these variables to good or poor adherence is observational and correlational. In addition, there is evidence that these variables overlap and interact. For example, people with poor body images and high dietary restraint are highly susceptible to emotional eating. There is much work that needs to be done to understand each of these variables individually. At present, there is very little systematic and concrete data on how these variables interact with each other. We do conclude that these variables are related to dietary adherence and as such are good candidates for being considered obstacles or barriers to adherence.

It should be noted that dividing the world into person and environment is somewhat arbitrary. For example, without an environment to create stressful situations, one would probably never experience negative emotions. Likewise, it could be argued that culture could not exist except for the fact that it is cognitively represented in the minds of individuals. To call emotions a person factor and culture an environmental factor is really a matter of degree or emphasis. The important point to keep in mind is that we are attempting to establish that eating behavior is regulated by a complex system of variables that are part of a person living in a specific environmental context.

*Environmental Barriers to Adherence*. There is a growing body of research on the many environmental variables that can influence human food intake. Environmental barriers studied are listed in Table 1. These include costs and economic resources, social support, food availability, competing demands, culture, and social interaction. The challenge for an individual who is trying to modify food intake is daunting indeed. It is clearly not a simple matter of having knowledge about what foods to eat, what foods to avoid, and what foods to limit. Eating is a behavior that is sensitive to many psychological, physiological, and environmental influences. The person determined to adopt a healthy eating pattern must regularly face many challenging obstacles that pressure the individual towards eating more food, and eating foods higher in fat and calories.

These findings suggest that a more comprehensive framework for understanding and influencing eating behavior needs to be developed. We have proposed in this paper what an outline of this framework might be. Much remains to be learned, however, about the individual variables in our proposed model and especially about how these variables interact. Eating practices are adapted to the cultural and micro-environment in which the individual functions on a daily basis. Changing eating practices without making changes in the environment often proves to be quite difficult.

Programs that emphasize the development of competencies and self-efficacy for overcoming the barriers to dietary adherence need to be developed and evaluated. The most important problem that needs to be addressed is how to help people maintain healthy changes in eating behavior over long periods of time. If dietary change is to be an

effective primary prevention strategy, then changes have to be substantial and long-lasting.

Table 1: Barriers to Eating Behavior Change

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<b>A. Personal Factors</b>	
1.	Stress and Emotions <sup>123-136</sup>
a.	negative emotions <sup>127-128, 130-131, 134</sup>
b.	binge eating <sup>126, 132, 134</sup>
c.	boredom <sup>131-134</sup>
d.	positive emotions <sup>127, 133</sup>
<b>B. Physiological Factors<sup>137-164</sup></b>	
1.	Hunger <sup>144, 147, 149, 157</sup>
2.	Cravings <sup>139, 150, 152-157</sup>
3.	Restrictive dieting <sup>143-145</sup>
4.	Taste <sup>158-164</sup>
<b>C. Cognitive Styles &amp; Information Processing<sup>165-169</sup></b>	
1.	Restraint <sup>170-177</sup>
2.	Extremism <sup>131, 178</sup>
3.	Perception of body size and shape <sup>179-187</sup>
4.	Self-efficacy beliefs <sup>188-192</sup>
<b>D. Environmental Factors</b>	
1.	Costs & economic resources <sup>158-159, 162, 193-194</sup>
2.	Social Support <sup>193-206</sup>
3.	Food availability <sup>207-208, 114, 135, 147</sup>
4.	Competing demands <sup>160, 210</sup>
5.	Culture <sup>211-230</sup>
6.	Social Interaction <sup>231-239</sup>

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#### *Summary of Review: Secondary Prevention of Breast Cancer.*

Breast cancer is the leading non-skin cancer affecting American women. One in nine women are expected to develop breast cancer at some time in their lives. More than 175,000 women are expected to develop the disease during 1993 and approximately 44,500 deaths will occur<sup>240</sup>. While breast cancer occurs more frequently in whites than blacks and in older women, its mortality rate is worse in poor and minority women<sup>241-243</sup>.

Although survival has increased for all women with breast cancer, disparities remain. The elderly, for example, are at increased risk, and black women continue to lag

behind whites<sup>244-246</sup>. The American Cancer Society (ACS) has concluded that survival differences between blacks and whites are primarily related to socioeconomic disparities<sup>240-241</sup>. Data suggest that much of the decrease in survival is due to late stage diagnosis among these women. Older women are less likely to have recently visited a physician or to have had breast exams/mammograms when seen<sup>247-249</sup>. Moreover the elderly are more likely to be inhibited by barriers to health care utilization and prevention which include factors such as a lack of knowledge<sup>250-257</sup>, access to services<sup>251-253, 258-259</sup>, availability of services<sup>254-255</sup>, economic constraints<sup>255-257</sup>, physical and attitudinal problems<sup>256</sup>, a decline in coping skills and lack of physician treatment/compliance<sup>250-257, 260</sup>. Poor women have other urgent life priorities, lack resources, are less educated, and have not had a tradition of health prevention practices<sup>262</sup> (see Table 2).

Nevertheless, several investigators have demonstrated that these women may be successfully reached and significant improvement in prevention/behavior/utilization can be effected<sup>261-264</sup>. Also, a number of investigators have shown the effectiveness of mobile screening as well as its advantages (e.g., no rent, easy access, and high visibility). Some investigators have targeted low-income women<sup>265</sup>. Most, however, have sought to reach more affluent women through industry, local government, or by locating at suburban shopping malls<sup>266-268</sup>.

It is apparent that black women, impoverished women, and older women are at a higher risk of dying from breast cancer than white, upper income and younger women. A number of risk factors have been found to be associated with their development, but their exact roles in the pathogenesis remain to be elucidated. This fact renders primary prevention difficult if not impossible. Nevertheless, these factors can pin-point susceptible or high risk groups of individuals who can be helped by screening and early detection.

Mortality from breast cancer is most preventable when diagnosed as "minimal" disease or in the absence of regional spread<sup>269-271</sup>. It is estimated that a 30 percent reduction in mortality could be effected through mammography alone<sup>269</sup> and as much as an 18 percent reduction with BSE (although the usefulness of BSE is controversial<sup>272</sup>). However, the use of these screening methods in combination is estimated to ultimately result in breast cancer mortality reduction of as much as 50 percent.

Mammography is the only screening test for cancer demonstrated by clinical trial to cause a decrease in cancer mortality<sup>258, 273-274</sup>. Its efficacy and safety are now well established, and problems of institutionalization now relate mainly to cost. However, quality control is an important factor in success. Screening recommendations by most organizations for this method relate to women greater than 40 years of age<sup>273</sup>. Although the past 5 years have witnessed an increase in the use of mammography, it continues to be costly and underutilized. Thirty-one percent of women have had mammography but only 17 percent of women have had a recent mammogram within one year<sup>273</sup>. For black women, only 14 percent have done so.

**Table 2: Perceived and Real Barriers to Breast Cancer Screening: Proposed Intervention Strategies**

<b><u>BARRIERS</u></b>	<b><u>STRATEGIES</u></b>
<b>Knowledge of Risk Factors</b> <sup>250-255</sup>	
1. Lack	<ul style="list-style-type: none"> <li>1. Educational techniques:           <ul style="list-style-type: none"> <li>a. Awareness campaign</li> <li>b. Information dissemination</li> <li>c. Low literacy literature</li> <li>d. Training               <ul style="list-style-type: none"> <li>(i) Physicians</li> <li>(ii) Paraprofessionals</li> </ul> </li> </ul> </li> </ul>
<b>Access to Cancer Control Services</b> <sup>251-253, 256</sup>	
1. Health-care use	<ul style="list-style-type: none"> <li>1. Transportation van</li> </ul>
2. Health-care personnel:	<ul style="list-style-type: none"> <li>2. Personal interaction/Ethnically sensitive/class sensitive</li> </ul>
	<ul style="list-style-type: none"> <li>3. Priority appointments</li> </ul>
<b>Availability of Services</b> <sup>252-254</sup>	
1. Services (Screening, Education)	<ul style="list-style-type: none"> <li>1. Mammography and Pap Smear</li> </ul>
2. Personnel	<ul style="list-style-type: none"> <li>2. Special program personnel</li> </ul>
	<ul style="list-style-type: none"> <li>3. Facilitate follow-up service</li> </ul>
<b>Cost of Service</b> <sup>244, 251-253,255-256, 258-259</sup>	
1. High	<ul style="list-style-type: none"> <li>1. Low cost mammogram</li> </ul>
	<ul style="list-style-type: none"> <li>2. Third party payor to cover costs</li> </ul>
	<ul style="list-style-type: none"> <li>3. Sliding scale based on income</li> </ul>
	<ul style="list-style-type: none"> <li>4. Grant funded vouchers for those unable to pay</li> </ul>
<b>Culture</b> <sup>252</sup>	
1. Poor social support mechanisms	<ul style="list-style-type: none"> <li>1. Train for cultural sensitivity</li> </ul>
2. Traditional health practices	<ul style="list-style-type: none"> <li>2. Use familiar sites e.g. clinics and</li> </ul>
health centers	<ul style="list-style-type: none"> <li>3. Build on favorable health practices</li> </ul>
a. Prayer	
b. Self-medication	
3. Attitudes of Fear and Inertia	
4. Disdain for usual health services	
<b>Physician Attitudes</b>	
1. Lack of appreciation of cultural attitudes in patient care.	<ul style="list-style-type: none"> <li>1. Design special educational sessions for residents and staff physicians to improve attitudes</li> </ul>
2. Lack of incentive for commitment of time for cancer prevention	<ul style="list-style-type: none"> <li>2. Design reminder screening system for physicians</li> </ul>

### ***Development of Interview Schedule.***

The literature reviews on obstacles to dietary change, breast self-examination, and mammography were used to create a structured interview. First, an item was developed to assess the individual's stage of change. Three separate interview schedules were developed. People in the precontemplation stage were asked to talk about why they are not interested in making the behavior change. People in the contemplation and preparation stages were asked to talk about what makes it hard for them to initiate the change. People in the action and the maintenance stages were asked to discuss what makes it hard to stick with changes they have made. A brief demographic assessment was also included to gather information on age, height, weight, education, and income.

Each interview begins with an open-ended question that asks participants to describe any specific experiences they could recall that were influential in their decision to change their behavior. Then, a series of questions about categories of adherence obstacles were asked. These categories were derived from our review of the literature. Table 3 describes the questions asked about reducing fat intake and increasing fruits and vegetables and Table 4 describes the questions asked about breast self-examination and mammography.

**Table 3 - Questions about Primary Prevention Behaviors**

Lack of family support
Too difficult to make diet changes
Financial costs/concerns
Habits and family traditions
Taste preferences for specific foods
Distrust of medical information
The time and effort involved
Not liking to make changes
Being under too much stress
Your job or the place you work
Being too busy
Your health
The way the foods make you feel
Unsure it is necessary to make diet changes

<b>Table - 4 Questions about Secondary Prevention Behaviors</b>
Lack of family support
Too difficult to do
Feeling uncomfortable, don't like to touch yourself/embarrassment
Fear you might find something
Distrust of medical information and doctors
The time or effort involved
Feeling anxious
Not knowing what to do
Not remembering to do it
Too much stress in your life
What the doctor told you/recommended
Your attitude towards cancer
Does not seem important/ does not seem necessary
Lack of money or health insurance
Not understanding the benefits
Fear of radiation
Transportation to the clinic
Fear of cancer
Fear of pain
Quality of Health Care facility

Within each of these areas, we ask for specific examples of everyday situations that will illustrate a difficulty. For example, if someone tells us that lack of money kept them from successfully increasing their intake of fruits and vegetables, we will ask them to describe a particular instance in which lack of money led them to choose not to purchase or not to eat fruits and vegetables. The questions will be carefully worded to make them easy to understand. The interview protocol will also include prepared prompts to help people who find it difficult to provide detailed information. The interviewer records the responses on the form during the interview. A copy of the complete interview protocol is in Appendix B.

***Selection of Subject Sample.***

In this initial phase of identifying and describing adherence obstacles, we did not attempt to obtain a population representative sample of subjects. Instead, we used convenient sources to recruit women that represent the full range of ages, education, and income levels. In this stage, we focused on interviewing African American Women exclusively.

**Conducting Interviews.**

The interviews were conducted by a registered dietitian who has received training in interviewing. In each setting, the interviewer made arrangements so that the interview could be conducted in a quiet room that offers privacy. Each subject was assigned a number, and their name or other identifying information did not appear on the interview transcripts. Participants were assured that all information they provided would remain strictly confidential and they then signed a consent form. Some participants were uncomfortable with the interview format. These participants were allowed to give written answers to the questions. The registered dietitian then reviewed the written answers before accepting them as part of the study.

To date, a total of 133 subjects have been interviewed. The mean age was 42 years old (S.D. 12.0). The average height was 64.9 inches (S.D. 2.8) and the mean weight was 188.8 pounds (S.D. 51.5). Body mass index was calculated and the mean BMI was 31.8 kg/m<sup>2</sup> (S.D. 8.1). Using the cut off of a body mass index of greater than 27.3 as the definition of overweight, 65% of the women participating in the interviews were classified as overweight. The sample as a whole could be described as middle aged, obese black women.

Table 5 shows the number of subject completing interviews for each behavior and the percentage of the subjects in each of the stages of change.

**Table 5 – Stages of Change for Primary and Secondary Prevention Behaviors**

Stage	Dietary Fat	Fruits & Veg	Breast S.E.	Mammogram
Precontemp%	12%	8%	5%	10%
Contemplation%	21%	25%	8%	7%
Preparation%	10%	22%	16%	6%
Action%	26%	10%	16%	22%
Maintenance%	29%	32%	53%	54%
Total Number	133	133	133	106

From Table 5, it appears that there are only a small number of participants who describe themselves as precontemplators. For the secondary prevention behaviors, the majority of participants claimed to be in the action or maintenance stage. The number of women who complete the mammography interview is smaller since this interview was only administered to women 40 years of age and older.

Table 6 presents the distribution of income and education in the sample.

<b>Table 6 - Demographic Characteristics of Interviewed Subjects</b>		
Group	Number	Percentage
Income		
\$10,000 - \$20,000	57	42.9%
\$20,000 - \$30,000	48	36.1%
\$30,000 - \$40,000	16	12.0%
\$40,000 and above	12	9.0%
Education		
7th-8 <sup>th</sup> grade	1	0.8%
9th-11 <sup>th</sup>	6	4.5%
High School	25	18.8%
Some College	57	42.9%
College Degree	33	24.8%
Graduate Work	11	8.3%

These data show that both lower and middle income women were included in the interview sample. The table also suggests that the sample is fairly well educated with the majority of women having gone to college.

#### Coding interviews.

Based on literature review and upon examining a small sample of the transcripts, we developed a coding system to allow us to classify different obstacles to adherence that are mentioned during the interviews. An outline of the coding system is presented in Table 7 and the complete coding manual is presented in Appendix C. The coding system is hierarchical. Explanations for adherence problems are divided into two major categories, psychological explanations and environmental explanations. Each of these is further subdivided. The far right hand column of the table shows which of these categories actually gets coded. Only the lowest level of the coding system results in

codes that are applied to the interviews. Because of the hierarchical structure, these codes can be later collapsed to look at higher order categories.

**Table 7 – Categories for Coding Obstacles to Adherence**

Number	Code description	Coded
1.0	Psychological Explanations	
1.1	Emotional Explanations	
1.1.1	Feeling trigger	
1.1.1.1	Negative emotion trigger	X
1.1.1.2	Fear trigger	X
1.1.1.3	Positive emotion trigger	X
1.1.1.4	Boredom trigger	X
1.1.1.5	Deprivation trigger	X
1.1.2	Feeling Consequence	
1.1.2.1	Negative emotional consequence	X
1.1.2.2	Positive emotional consequence	X
1.1.2.3	Embarrassment consequence	X
1.1.2.4	Guilt or Shame consequence	X
1.2	Personality trait explanations	
1.2.1	Laziness	X
1.2.2	Other personality traits	X
1.3	Physiological explanations	
1.3.1	Cravings	X
1.3.2	Hunger	X
1.3.3	Pain trigger	X
1.3.4	Pain consequence	X
1.3.5	Health	X
1.4	Cognitive explanations	
1.4.1	Thoughts as triggers	
1.4.1.1	I failed	X

1.4.1.2	Lack of confidence	X
1.4.1.3	Difficulty	X
1.4.1.4	Lack of knowledge or information	X
1.4.1.5	Other thoughts	X
1.4.2	Thoughts as consequences	
1.4.2.1	Negative self-evaluation	X
1.4.2.2	Loss of pride or self-esteem	X
1.4.2.3	Not liking to change	X
1.4.2.4	Unsure of benefits	X
2.0	Environmental Explanations	
2.1	Financial	
2.1.1	Poverty	X
2.1.2	Specific costs	X
2.1.3	Competing costs	X
2.2	Family	
2.2.1	Emotional support	X
2.2.2	Tangible support	X
2.2.3	Conflict	X
2.2.4	Sabotage	X
2.2.5	Family tradition	X
2.2.6	Family demands	X
2.3	Work	
2.3.1	Work demands	X
2.3.2	Work environment	
2.3.2.1	Actions of coworkers	X
2.3.2.2	Rules of the work place	X
2.3.2.3	Resources of the work place	X
2.3.2.4	Other aspect of work	X
2.4	Home environment	
2.4.1	Resources	X
2.4.2	Space	X

2.4.3	Other aspects of home	X
2.5	Community	
2.5.1	Travel and transportation	X
2.5.2	Resources	
2.5.2.1	Restaurants	X
2.5.2.2	Fast food	X
2.5.2.3	Groceries	X
2.5.2.4	Medical resources	X
2.5.3	Health beliefs, practices, and traditions	
2.5.3.1	Religious traditions	X
2.5.3.2	Social events	X
2.5.3.3	Social sanction	X
2.5.3.4	Folk beliefs	X
2.5.3.5	Attitudes towards medicine	X
2.6	Interpersonal	
2.6.1	Social facilitation	X
2.6.2	Conflict	X
2.6.3	Lack of social support	X

Coders will include the registered dietitian, a research assistant, and psychology students from Vanderbilt who will participate for independent study course credit. Dr. Schlundt has successfully used undergraduate coders in past research<sup>132-133</sup>. The coders will be trained and they will be required to code a standard set of transcripts with at least 90% reliability before working on the actual data. A 15% sample of transcripts will be selected at random and coded independently by two coders so that the reliability of the coding procedures can be estimated.

The results of this step will be a description of all the different types of obstacles mentioned for each behavior, and the frequency with which each obstacle was mentioned. At this stage, we will make comparisons between low SES and higher SES subjects to determine if there is a difference in the types of obstacles mentioned as a function of education and income. We will also make comparisons between the different stages of change to see how the obstacles systematically differ as a function of people's position on the change continuum. These comparisons will be made using contingency table analysis and other methods appropriate for qualitative data.

### **Extracting and classifying problem situations.**

Following the methodology of Schlundt and colleagues<sup>132-133</sup>, the examples of everyday situations provided during the interviews will be written into verbal descriptions. We will adapt the coding system used in our diabetes studies of obstacles to dietary adherence. Trained coders will apply the coding system to the sample of vignettes, and the reliability of their work will be determined. Cluster analysis will be used to form a taxonomy of problem situations separately for each of the 2 primary and 2 secondary prevention behaviors. We will employ Ward's method using squared Euclidean distances and will generate a dendrogram to represent the results of the analysis. Homogeneous groups or clusters of problem situations will be identified from the dendrogram and each group or cluster will be given a name to describe the kind of everyday situation it represents.

### **Summary of data and description of adherence obstacles.**

Data from coding the interviews, and from the situational taxonomy will be integrated and, for each behavior, a list of adherence obstacles will be generated. A brief written description with examples will be generated for each category of adherence obstacle so that we can easily communicate our findings with others. At this stage, we will have empirically identified, described, and classified the obstacles to making behavior changes. The extent to which the obstacles differ according to stage of change and SES will be summarized in this manuscript. This document will be a valuable resource for anyone wishing to develop intervention programs to change the primary and/or secondary prevention behaviors for breast cancer, since it will clearly and concisely outline a set of empirically identified obstacles to making behavior changes.

### **Use of focus groups to confirm and refine findings from interviews.**

Once the data from the interviews and the taxonomy studies have been summarized, we will review this information using focus groups of women recruited from the same sources as the interview participants. Each group will examine one of the primary or secondary prevention behaviors. We will present the list of obstacles to adherence and the group will discuss each item on the list. These discussions will be used to refine the descriptions and definitions of each obstacle, to determine if some categories should be combined or further subdivided, and to see if the groups identify any categories of barriers to these behaviors that were omitted. Our written summary of adherence obstacles will be revised as needed.

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## **Appendix A**

## **Literature Review**

## Obstacles to Dietary Adherence

In the late 20<sup>th</sup> century, the major sources of morbidity and mortality have become chronic diseases that have lifestyle risk factors<sup>1-8</sup>. Heart disease, the most common cause of death, is clearly associated with diet, exercise, smoking, and stress<sup>10-19</sup>. Cancer, diabetes, hypertension, stroke, and obesity also are associated with eating, smoking, and physical activity<sup>20-24</sup>. While each of these diseases may have genetic factors that influence an individual's risk, a major thrust of treatment and prevention involves asking people to make changes in risky behaviors<sup>25-29</sup>.

Even though medical technology is constantly improving the ability to treat cancers and cardiovascular diseases, the major challenge in the field of health care is to find ways to prevent or delay serious illness. Changing dietary intake in the American population has become a national goal as evidenced in the Healthy People 2000 objectives<sup>30-31</sup>. Reducing fat intake and increasing consumption of fresh fruits and vegetables are the major changes in nutritional practices that are hoped to result in reduced prevalence of cancers, diabetes, obesity, and heart disease<sup>31</sup>. While there is little evidence that large scale dietary changes will have a substantial effect on morbidity and mortality, there is sufficient evidence to suggest that improvements in nutritional practices will result in short-term improvements in health outcomes<sup>32-34</sup>.

### **The Target: Understanding Eating as a Behavior**

While there is considerable agreement on the need to decrease fat intake and increase the consumption of fruits and vegetables, there is little consensus on how to accomplish these goals. The traditional approach has been to assume that a well informed public will adopt healthy practices. There is ample evidence that Americans understand the need to eat less fat and eat more fruits and vegetables, while at the same time there is evidence that little change has actually been made<sup>35-36</sup>.

At least one part of the problem is an inadequate understanding of eating as a behavior that is complex, multiply determined, culturally conditioned, and inherently variable<sup>37</sup>. There are many factors that intervene between the knowledge of what constitutes good nutrition and the foods an individual consumes from one day to the next. Each discipline tends to focus only on the one or two aspects of eating that are of interest to that discipline's questions. Nutritionists tend to focus on the macronutrient and micronutrient content of people's usual dietary intakes and the development of healthy meal plans. Epidemiologists look at the links between specific foods and nutrients and health outcomes. Others focus primarily on specific dietary constituents such as sodium, potassium, saturated fat, or carbohydrate. Few scientists interested in nutrition and health are able to see the forest for the trees.

The lack of appropriate measurement tools for assessing the full complexity of eating behaviors is a major reason for the inadequate conceptualization of eating as a complex, patterned behavior<sup>37</sup>. Most approaches to the measurement of eating behavior attempt to capture usual or typical practices. Even when researchers recognize the sensitivity of eating behavior to the cultural context, the focus is usually on assessing only a limited aspect of the behavior<sup>38</sup>.

Eating, being essential to the survival of all animals, is one of the most fundamental activities of the human being. It is therefore not surprising that the act of ingesting food has come to have multiple layers of personal and cultural meaning, and that this act, because of its daily

frequency, must be totally integrated into the matrix of daily activities of the individual, the family, and the community<sup>39</sup>. Because eating is such a complicated behavior, it makes little sense to discuss the reduction of dietary fat or the increase of fruit and vegetable consumption as though these were things people could easily decide to do. People don't consume fat or eat fruits and vegetables, people eat meals and snacks several times a day in a variety of social and environmental situations. The only way we can hope to reduce the risk of chronic disease through nutrition change is to begin to study eating as a behavior in all its richness and complexity.

### The Process of Behavior Change

An understanding of how people make and maintain changes in complex, real-world behaviors is necessary in order to develop intervention strategies that have a good chance of changing food intake and reducing chronic disease risk. At the present time, our understanding of this process consists of a number of theoretical models. These models overlap in many respects and yet each one emphasizes different aspects of features of the behavior change process<sup>40-42</sup>. The Health Belief Model, for example, suggests that people make choices to change their behavior on the basis of their perceptions of their risk of experiencing serious medical outcomes and the benefits of making changes<sup>43</sup>. The Theory of Reasoned Action describes how behavioral intentions are influenced by attitudes, perceived consequences, and social norms<sup>44</sup>.

Recently, a great deal of attention has been generated by the Transtheoretical Model of behavior change. In essence, this model proposes that people must move through a series of stages from contemplation of a change to making a decision to actually implementing a change. The variables that influence change differ depending upon the individual's stage of change<sup>45-46</sup>. This theoretical approach has been very successful in understanding addictive behaviors and is now being applied to the more complex situation of changing eating behavior<sup>47-48</sup>.

The Relapse Prevention Model sees the process of changing appetitive behaviors like eating, smoking, and alcohol use as an ongoing process. People establish certain abstinence rules, such as I will not smoke or I will not eat ice cream. Because of social, environmental, and physiological pressures, people tend to slip and violate these rules from time to time. The process of coping or failing to cope with these violations is crucial in determining whether or not the behavior change will be temporary or long-lasting<sup>49-50</sup>.

Common to all of these theoretical perspectives is the idea that certain people or situations delay, impede, or prevent people from contemplating, making, and maintaining behavior changes. While the terminology differs from one theoretical perspective to the next, the underlying theme is similar. The terms barriers to behavior change, or obstacles to behavior change have come to be commonly used to describe these situational factors that transform the intention to act a certain way into the occurrence of a different and often incompatible behavior<sup>41-42</sup>.

Not only is eating a complex behavior, but changing eating is a dynamic process that is influenced by many biological, psychological, interpersonal, and environmental variables. To induce wide spread changes in people's food intake in order to reduce the risk of chronic disease, it will be necessary to have a more complete understanding of the complexity of eating and the process of making and maintaining changes in eating. The task is partly descriptive in that it will be necessary to identify and describe the many different variables that can influence food intake and changes in food intake. This task is also partly theoretical in that it will require an expansion of existing theoretical models to encompass the full range of relevant findings. In fact, there is a

constant interplay between observation and theory since theory guides what we look for and measure while the findings of these studies lead us to modify our theories.

### **A Biological-Cognitive-Environmental Approach to Understanding Eating Behavior " \ 3**

First, we will articulate a theoretical model of eating behavior that has great heuristic value for organizing the literature and guiding observations. Then, we will examine the empirical literature on food intake and adherence to dietary recommendations to demonstrate that the variables identified by the theoretical model are important.

The theoretical model is based on the perspective developed by Schlundt and Johnson<sup>51</sup>. The approach begins with a social learning theory understanding that behaviors are influenced and controlled by environmental antecedents and consequences<sup>52-53</sup>. The individual is conceived of as a real-time information processing system that behaves in a way that will maximize reward and minimize punishment given a set of perceived circumstances. The person brings into the situation cognitive schemata, organized sets of ideas and beliefs, that are used to perceive and understand the immediate situation. These schemata provide the individual with instructions for setting goals, understanding events, interpreting situations, and anticipating the consequences of various actions. These cognitive schemata also tell the individual what he or she is capable of doing along with memories of how similar situations have turned out in the past. The individual does not passively respond to stimuli. Rather people are able to plan and undertake actions that allow them to achieve short-term and long-term goals<sup>54</sup>.

Three categories of antecedents and consequences are considered in detail. Antecedents and consequences can be physiological, environmental, and cognitive-behavioral. The cognitive behavioral components consists of thoughts, actions, and emotions. A situation, such as eating a meal at an all-you-can eat buffet, is conceived of as the person's perception of the interaction of physiological, environmental, and behavioral events. The person may be hungry or tired. The person might be alone or with a large group of people. The buffet may have appealing foods or it may be unappealing. The person brings to the situation memories about past experiences with buffets and a set of ideas and beliefs about what constitutes healthy food choices and what does not. The behavior, filling one's plate with food and eating it, leads to an array of biological, environmental, and cognitive/affective consequences. The person may feel bloated and full, might be ridiculed by a spouse for consuming too much food, and may be experiencing guilt and remorse over having overeaten. These outcomes become part of memory and may come to influence choices at a future buffet.

Each act of eating can be potentially influenced by a host of internal and external variables and will also have consequences in each of these domains. Food is chosen in response to this matrix of implicit and explicit perceptions and expectations. These ideas and expectations are concerned not only with the foods per se, but also with the social and personal meaning of food. For example, the idea of eating a bag of potato chips as a snack might be anticipated to taste good and reduce hunger, but also might violate personal dietary rules and could also go against social or family norms which could lead to interpersonal and emotional consequences. People value these different outcomes to differing degrees. The choice of food therefore involves a balancing or compromise that over the entire set of anticipated consequences allows the individual to find an acceptable way to maximize reward and minimize punishment.

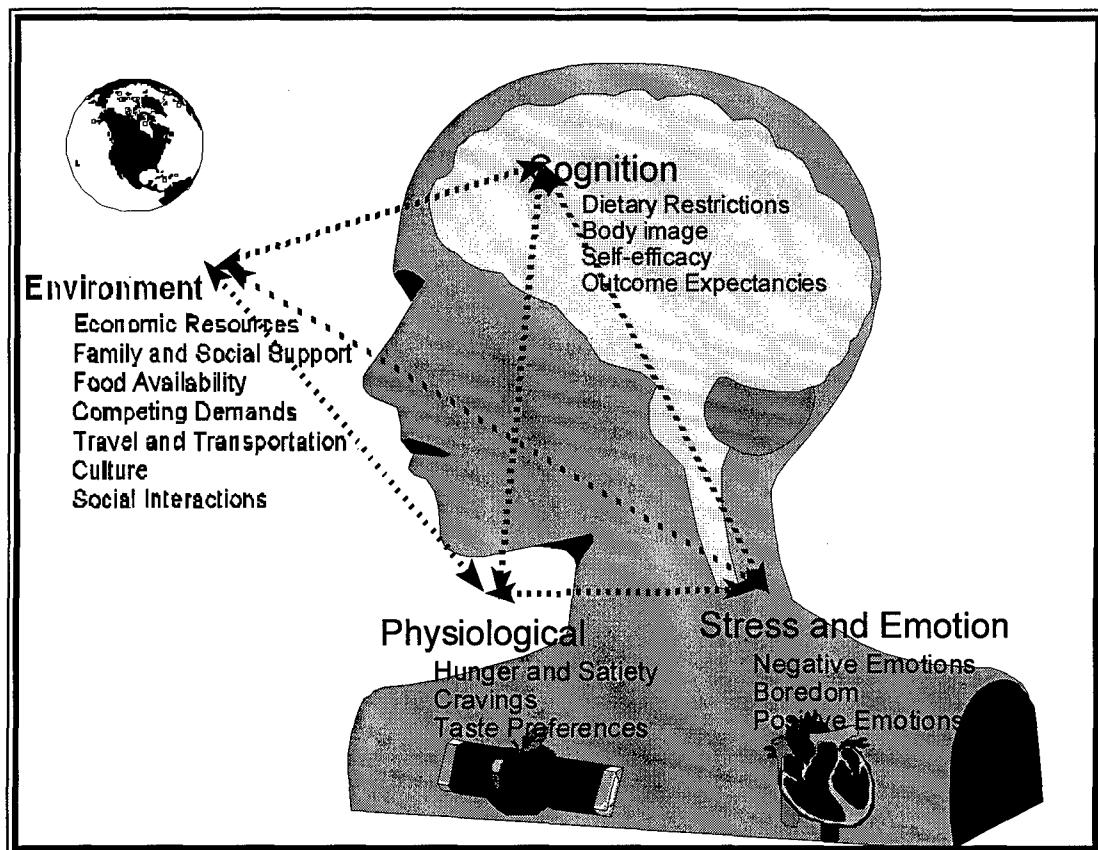
Eating behavior occurs in the context of personal cognitive schemata, physiological pressures influencing appetite and satiety, and a complex cultural environment. Theoretically, we are viewing each act of eating behavior as the end product of multiple, interacting causal factors.

The advice to follow a healthy diet is only one of many factors that comes into play when a person is deciding whether or what to eat. Given this understanding of how food intake is regulated, it is not surprising at all that adherence to dietary recommendations is rather poor.

Obstacles to dietary adherence can be understood from this theoretical perspective as antecedents or consequences that reduce the probability of following dietary recommendations or that increase the probability of incompatible selections. These obstacles operate differently depending upon the specifics of the situation in which eating behavior is occurring. For example, hunger may or may not play a role in the selection of foods depending upon how long it has been since the last meal, the size and composition of the last meal, and other biological factors that may dampen or amplify hunger or satiety signals. Potentially, however, hunger is an obstacle to adherence if someone anticipates that making food choices incompatible with the dietary prescription will better reduce hunger. In fact, different foods have different consequential physiological impacts on hunger and these impacts decidedly shape expectations over time. Hunger could therefore be a real obstacle when faced with the choice of snacking on carrot sticks versus cheese puffs.

Figure 1 presents an overview of the model along with the specific variables that will guide our literature review. The individual is represented in the center of the figure and consists of three major components. The cognitive element has four parts: dietary restrictions, body image, self-efficacy, and outcome expectancies. Stress and emotions are also a part of the individual and have the three elements of negative emotions, boredom, and positive emotions. The individual's physiology will be understood in terms of three components: hunger/satiety, food cravings, and taste preferences. The environment, that which is in the world outside of the individual, is represented by six components: economic resources, family and social support, food availability, competing demands, culture, and social interactions.

In Figure 1, lines connect each component with every other component to indicate that all these variable interact to produce eating behavior. Together, these components — the individual living in an environment — form a system that controls and influences food intake. As with any other system, a change in one component can effect other components and ultimately change the overall behavior of the system. The implication of this assumption is that any demonstration that a single variable can alter food intake does not prove that this variable is the critical or only factor that is involved in the regulation of eating behavior. For example, showing that a drug will suppress appetite and reduce food intake does not mean that culture, food cognitions, or emotions are not also important influences over food intake. What you have shown is that the feeding system is responsive to changes in certain physiological variables.



In summary, we have described a theoretical approach to the regulation of food intake that will allow us to better understand how and why people have such a difficult time making long-term changes in their eating behaviors. Eating behavior is controlled by antecedent and consequent events that occur both within the individual and outside of the individual in the environment. Any particular episode of eating has to be understood in terms of how all of these variables potentially interact in order to influence the choice of what and how much to eat.

In the following sections, we will review the literature to show that each of the variables we have identified has been demonstrated to have an effect on eating behavior and that variables within this domain are aptly considered obstacles to dietary adherence. In developing this literature review, we have drawn on a very diverse set of studies. We examined not only studies that were explicitly focused on obstacles to adherence, but also basic research on the regulation of food intake, work on weight reduction in obesity, and studies of overeating and binge eating.

### **Obstacles to Dietary Change: Persons**

Before diving into the literature on how person variables influence eating behavior and can function as obstacles to adherence, it is worth noting that dividing the world into person and environment is somewhat arbitrary. For example, without an environment to create stressful situations, one would probably never experience negative emotions. Likewise, it could be argued that culture could not exist except for the fact that it is cognitively represented in the minds of individuals. To call emotions a person factor and culture an environmental factor is really a matter of degree or emphasis. The important point to keep in mind is that we are attempting to

establish that eating behavior is regulated by a complex system of variables that are part of a person living in a specific environmental context.

**Stress and Emotions**. The first area we will review is the relationship between eating behavior, dietary adherence and emotion. There has been considerable interest over the years in the concept of emotional eating<sup>55-57</sup>. Emotional eating occurs when a person eats in response to stress or negative affect and this eating is used as a way to cope with the emotion. Eating is thought to either reduce the strength of the emotion through either cognitive (e.g., distraction) or physiological (e.g., serotonin, endogenous opiodes) pathways<sup>51</sup> or to serve as a temporary escape from negative affect<sup>58-59</sup>.

*Negative moods*. Schlundt and Zimering<sup>60</sup> develop the Dieter's Inventory of Eating Temptations (DIET) questionnaire to measure people's competency at coping with different kinds of eating situations. One subscale of this inventory measured eating in response to negative emotions. They compared 193 normal weight subjects to 168 overweight subjects and found a significant difference on the negative emotional eating scale. A more detailed analysis showed that there were subgroups of individuals in both the normal weight and overweight samples that could be characterized as emotional eaters.

Eldridge and Agras<sup>61</sup> compared subjects with binge eating disorder, eating disorder not otherwise specified, to non-obese individuals with no eating disorder. Those with eating disorders were more likely to eat in response to negative emotions than control subjects, and those who were most overweight showed more emotional eating.

Blaire, Lewis, and Booth<sup>62</sup> followed 187 adults for one year. Body mass index (BMI) was positively correlated with emotional eating. Those initially high on emotional eating who reduced their frequency of emotional eating were more successful in losing weight over the one year period than those who continued to be high on emotional eating. Subjects who showed an increase in emotional eating over the 1-year period were more likely to gain weight than subjects who maintained a low level of emotional eating. Thus the frequency of emotional eating was predictive of efforts to control body weight over a one year period in a prospective study.

Lowe and Fisher<sup>63</sup> compared 30 normal weight to 17 overweight female college students. The students kept food diaries for 12 days monitoring their food intake and mood prior to each meal or snack. The obese subjects were more likely to overeat in response to negative emotions than the normal weight subjects at snacks but not at regular meals. However, there was a significant correlation between emotional eating and degree of overweight at both meals and snacks.

Schlundt and colleagues<sup>64</sup> analyzed 2-week food diaries from 236 obese women participating in a behavioral weight control program. Measures of eating in response to mood, and situational antecedents were extracted from each diary and a cluster analysis was conducted resulting in five groups: 1) moderately healthy eating habits, 2) chronic food restrictors, 3) alternating diet-bingers, 4) emotional overeaters, and 5) unrestricted meal overeaters. Two of the groups — the alternating diet-bingers and the emotional overeaters — showed a clear pattern of increased calorie and fat intake at meals associated with negative feelings. In addition, these subjects were more likely to overeat and to eat unplanned snacks when they felt bad than subjects in the other groups.

Schlundt and colleagues studied adherence to dietary recommendations in adults<sup>65</sup> and adolescents<sup>66</sup> with diabetes. They interviewed subjects and asked them to describe every day

situations that make it difficult to follow a prescribed diet. These descriptions were edited and coded and then grouped using a cluster analysis. In both samples, emotional eating emerged as a problem situation for dietary adherence.

When Johnson<sup>67</sup> and colleagues compared detailed eating diaries of women with Binge Eating Disorder, subclinical eating disorder, to women without an eating disorder, the behavior pattern of overeating in response to negative emotions was found in all three groups. What differed was the probabilities. That is women with Binge Eating disorder were five times more likely to overeat when experiencing negative moods than non-eating disordered women.

Schlundt, Sbrocco, and Bell<sup>68</sup> studied adherence to a weight loss diet in 35 subjects using detailed food diaries. The diaries were analyzed to identify situational and emotional variables associated with overeating and impulsive eating. When moods were rated as negative, subjects were at least 25% more likely to overeat than when their mood was neutral. Moods interacted with situational variables such that emotion-induced overeating was far more likely when home alone than when eating with other people at home. In addition, one episode of overeating was far more likely to be followed by another episode of overeating than by compliant behavior suggesting that overeating episodes occur in chains or bouts.

*Positive moods and boredom. Other emotional states, such as boredom or positive moods, have received less study in relationship to eating behavior than negative moods.* Schlundt, Sbrocco, and Bell<sup>68</sup> found that positive moods were associated with overeating when people were away from home at restaurants and social events and eating with family or friends. The DIET questionnaire<sup>60</sup> has a scale called positive social eating which reflects overeating with friends or family and in a good mood. This scale, however, does not discriminate between obese and normal weight individuals. The reason for this is that most people tend to report having at least some difficulty with this kind of situation. Lowe and Fisher<sup>63</sup> reported in their diary study of overeating and moods that there was no association between overeating and positive moods.

In the Schlundt et al microanalysis of the eating diaries of 236 obese women<sup>64</sup>, boredom was one of the mood adjectives subjects could check off at each meal or snack. Boredom was associated with both overeating and impulsive eating and was the greatest problem for subjects grouped into the alternating diet-binge subgroup. Boredom. Nowak and Speare<sup>69</sup>, in a descriptive study of the health habits of adolescents, reported that eating in response to boredom was more commonly described as a problem among girls rather than boys. In their interview study on adherence in adolescents with diabetes, Schlundt et al<sup>66</sup> found that eating in response to boredom emerged as a separate category of adherence obstacles.

*Summary of moods.* In summary, there is considerable evidence that at least a subset of people regularly overeat or even binge eat in response to negative emotions. This emotional eating pattern has been associated with being overweight, with failure to lose weight, and with weight gain over a period of a year. It also perceived as a barrier to adherence by patients attempting to follow a therapeutic regimen. While there are competing theoretical understandings of this phenomena, the data clearly suggest that eating in response to negative moods is a common pattern of behavior and should be considered an obstacle to adherence. The data on other mood states is less extensive and less consistent. There may be a general tendency to overeat during social situations where the mood is positive. In addition, at least some people may experience difficulty in adhering to dietary regimens when faced with feelings of boredom.

**Physiological factors as obstacles to adherence.** There is a tremendous body of research on the physiological regulation of food intake<sup>70-75</sup> and a complete examination of this literature is beyond the scope of this review. We will examine physiological variables or systems that are perceived to have a direct impact on dietary adherence. For the most part, we will examine how changes in these systems impact eating behavior or compliance.

*Hunger.* Hunger is the most obvious physiological state associated with eating and with dietary adherence. Hunger is the perceptual correlate of physiological appetite mechanisms, although this correlation is probably less than perfect. The relationship between hunger and adherence is not necessarily obvious. The literature is clear in its demonstration that restrictive dieting can lead to overeating or even binge eating<sup>76-78</sup>, although this statement is not without controversy<sup>79</sup>. However, the role of hunger in this relationship has not been so clearly established. Schlundt<sup>80</sup> and colleagues studied the sequential meal patterns of 96 obese women who signed up to participate in a behavioral weight loss program. Meal skipping was associated with higher probabilities of overeating and impulsive eating. However, an analysis of hunger ratings showed that subjects were more likely to overeat when not hungry than when they were hungry. In the study by Schlundt, Sbrocco, and Bell, hunger was rated on a three point scale from not hungry to very hungry. Under certain situations (e.g., eating supper or riding in the car), being very hungry was highly associated with overeating and impulsive eating. In other situations (eating with family, in a negative mood), not hungry was associated with higher levels of impulsive eating.

Stanton, Garcia, and Green<sup>81</sup> examined situations related to dietary slips in dieters. Five distinct types of high risk situations were identified and labeled relaxation, food present, reward, negative feelings, and hunger. However, only subjects ratings of the self-efficacy in controlling overeating in situations involving negative feelings was predictive of successful weight loss.

While it seems obvious that people will find it more difficult to adhere to a preventive or therapeutic diet when they are hungry, the literature suggests that the relationship between hunger and dietary compliance depends upon the situation and upon the individual's history of dieting and overeating<sup>77,80</sup>. In fact, there is some evidence that consumption of low fat, high carbohydrate, high fiber foods leads to reduced levels of hunger and better regulation of food intake than a diet that is highly dense in calories due to added fats and simple sugars<sup>82</sup>. We can conclude, however, that under certain circumstances hunger can function as an obstacle to adherence.

*Craving.* The craving for a specific food or type of food is qualitatively different than hunger and is thought to arise, at least in part, from physiological processes. Evidence in favor of specific cravings is that the intake of protein, carbohydrate, and fats are regulated by different control systems in the brain<sup>72</sup> and that cravings are associated with difference phases of the menstrual cycle in women<sup>83</sup>. There has been some suggestion that the experience of craving sweets is due to a relative depletion of the neurotransmitter serotonin in the brain<sup>84</sup>.

Hill and Heaton-Brown<sup>85</sup> had 25 women keep food diaries in which they recorded food cravings. There were an average of 2 cravings per week with 49% being cravings for chocolate. Food cravings increased pre-menstrually, and were in general satisfied by the consumption of highly pleasant tasting foods. In another diary study<sup>86</sup>, 20 subjects who frequently craved chocolate were compared to 20 controls using a 7-day food diary. In this study, chocolate

craving was associated with feelings of guilt and depression which generally got worse after the consumption of chocolate.

Schlundt & Virts<sup>87</sup> compared 40 women who frequently reported cravings sweets to 40 who rarely reported craving sweets on 2-week eating diaries. There were no differences between the two groups in any aspect of eating behavior. Eating episodes associated with craving sweets tended to be somewhat higher in fat than other meals and snacks. However, a sequential analysis of the food diaries showed that the experience of craving sweets in both groups of subjects was associated with overeating, impulsive eating, and the abstinence violation effect. The findings of this study suggest that the experience of craving sweets can disrupt dietary adherence, whether this state is experienced seldom or frequently.

Weingarten and Elston<sup>88</sup> studied the experience of food cravings in 1138 college students using a self-report questionnaire. Sixty-eight percent of men and 98% of women reported having experienced food cravings. For those experiencing cravings, the typical frequency was 5-9 times per month with chocolate being the most frequently craved food in both men and women. Pizza, salty foods, ice cream, and sweets were also reported as foods both men and women crave. Eighty-five percent of men and 86% of women reported indulging in the craved food more than 50% of the time.

Hill, Weaver, and Blundell<sup>89</sup> had 10 subjects who regularly experienced food cravings and 10 who rarely experienced food cravings keep a 5-day food diary. There were few difference in food intake between the two groups, with the frequent cravers consuming slightly greater amounts of energy. Episodes of food craving were associated with boredom and anxiety while there was no evidence that food cravings occurred as a result of food deprivation.

Kassel and Shiffman<sup>90</sup> examined the constructs of hunger and craving in relationship to both food and drugs. They concluded that hunger and craving are not simple constructs. Neither has a simple relationship to an underlying biological need, neither has reliable physiological correlates, and neither predicts consumption well. It would appear that the experience of craving a food, although perceived as a physiological urge or need, is an experience that has cognitive and affective elements as well. Despite the difficulty in understanding scientifically what it might mean to crave a particular food, there is evidence that this experience can lead to disruptions in dietary self-regulation and should therefore be considered a potential obstacle to adherence.

*Food taste and food preferences.* Food taste is another aspect of the physical process of eating food that is potentially linked to dietary adherence. If recommended foods do not taste as good as forbidden foods, people may be tempted to abandon their healthy diet.

Kristal et al.<sup>91</sup> in a large cross sectional study investigated the correlations of adherence to a healthy diet low in fat, and high in fruits, vegetables, and fiber. They found modest correlations between healthy eating and a set of measures that included liking the taste of low-fat foods.

Data from the cancer control supplement of the 1987 national health interview survey addressed knowledge and attitudes about nutrition and cancer prevention<sup>92</sup>. While many respondents reported having made changes in their diet to reduce disease risk, one of the most common reasons given for not making changes was liking or enjoying the foods currently eaten.

Dittus et al<sup>93</sup> obtained mail surveys from 1069 subjects in order to examine the relationship between attitudes and beliefs and the consumption of fruits and vegetables. They found that barriers to making change were the best predictor of the level of fruit and vegetable

consumption. Although data were not presented for the individual items, 3 of the 8 items in the barriers scale were related to taste or preference for fruits and vegetables.

Iszler et al.<sup>94</sup> conducted focus groups in order to plan a low fat dietary intervention in rural North Dakota. The groups were conducted with men and women in different age categories. A qualitative analysis of the groups showed that complaints about low fat foods not tasting good were common. In addition, the anticipation that family members would not like the taste of low fat foods was also cited as a potential barrier to adopting a low-fat diet.

Forty eight cardiac patients were given a structured interview to determine the barriers to making dietary changes<sup>95</sup>. Most patients reported at least one barrier, with 42% complaining that healthy food did not taste good. Lack of interest or lack of knowledge were seldom cited as barriers to changing diet.

El Kebbi et al.<sup>96</sup> conducted focus groups with 45 African Americans with NIDDM to determine the potential barriers to dietary behavior change. Most of the participants felt that the recommended healthy meal plans for diabetics did not taste good. In addition, family members often insisted that food be seasoned with fat in order to improve its taste.

It appears to be a consistent finding across a number of studies that food preference and taste can be an obstacle to making and maintaining dietary behavior changes. People tend to get used to the foods they have been eating, and are reluctant or unwilling to make changes. In addition, there is considerable evidence from taste research that foods high in fat, sugar, and especially the combination of fat and sugar are highly preferred across cultures<sup>97</sup>. It may be very literally true that healthy, low fat foods do not taste as good to humans as those high in fat, especially sweet desserts. It is very reasonable to conclude that food taste and preference is an obstacle to making dietary behavior changes.

**Cognitive styles and information processing**. In recent years, there has been a growing interest in studying cognition and eating behavior. Practically, there is the hope that a more detailed understanding of how people process information about food and eating can lead to improved methods of assessment<sup>98</sup>. Other researchers are interested in how cognitive problems can lead to disturbances in eating behavior<sup>99</sup>, as well as how the methods and techniques of cognitive therapy can be applied to changing eating<sup>100-102</sup>.

*Dietary restraint*. One of the major areas of inquiry into the cognitive regulation of food intake has been the study of dietary restraint. Dietary restraint occurs when people eat less food than they would like to. A number of measures have been developed to assess cognitions and behaviors thought to be related to this construct<sup>103</sup> including the restraint scale<sup>104</sup>, the three-factor eating questionnaire<sup>105</sup>, and the Dutch eating behavior questionnaire<sup>106</sup>.

Originally, it was hoped that the concept of dietary restraint would explain overeating and obesity<sup>107-108</sup>. The idea was that people who restrict their food intake become susceptible to disinhibition, or overeating, under different circumstances. Many laboratory studies have been conducted to demonstrate the kinds of situational manipulations that can trigger overeating in restrained eaters but not in unrestrained eaters<sup>77,107</sup>. In general, cognitive restraint does have an impact on eating behavior, but its impact depends upon the person's current weight, weight history, and propensity towards overeating<sup>77</sup>. The construct has been mostly applied to the study of obesity and eating disorders, but there has been some attempt to examine its effect in normal individuals<sup>109</sup> and to use it to understand compliance in diabetes<sup>110</sup>.

Any nutritional regimen, whether for the treatment or the prevention of disease, requires

that people adopt some degree of dietary restraint. That is, they must set up rules concerning what foods must be avoided and what foods must be limited. The research on restraint suggests that the adoption of restriction rule per se may not cause problems, but the adoption of extreme rules can lead to unstable eating behavior. For example, in the Schlundt et al.<sup>64</sup> study of 236 obese women who kept 2-week food diaries, three of the subject groups were high on dietary restraint. Two groups had relatively few problems adhering to their regimen of food restriction while the third group showed a pattern of alternating between dieting and bingeing. It is likely that a pattern of all-or-nothing thinking and perfectionism make rules unrealistic and hard to follow. The adoption of unrealistic rules increases their chance of violation which creates a pattern of alternation between strict adherence and non-adherence<sup>111</sup>.

*Body image.* The perception of the size and shape of one's body is often referred to as body image<sup>112-113</sup>. Schlundt and Jonhson<sup>51</sup> have discussed this from an information processing perspective and argued that body image integrates thoughts, feeling, and perceptions into a single cognitive schema. In women, body image typically refers to a problem of wanting to be thinner or to weigh less than one currently is. There is an extensive literature on the role of body image in eating disorders<sup>114</sup>, and also much literature on body image and dieting in the population at large<sup>115-116</sup>. A poor body image is associated with difficulties in the regulation of food intake and is usually correlated with measures of dietary restraint<sup>117-118</sup>.

While it is clear that a substantial portion of the female population and a smaller but significant number of males are dissatisfied with their weight and shape, it is not clear what impact this has on people's everyday eating behaviors and on attempts to adhere to a health promoting diet. There are connections between thoughts about weight and eating behaviors, and these have been documented across racial and socioeconomic differences<sup>119</sup>. These pressures to be thin appears to lessen as people get older, but even in older adults there is a desire to lose weight that may be an important cognitive factor influencing the choice of what and how much to eat<sup>120</sup>.

*Self-efficacy*. Self-efficacy beliefs have also received a good deal of attention as cognitive variables influencing food take and adherence to dietary regimens. Self-efficacy is the belief that one is capable of accomplishing some task. It is similar to self-confidence, but only more specific. People will not take on projects that they do not think will be successful. If a person were contemplating trying to lose weight, he or she might not attempt weight loss if there was a lack of confidence about being able to do everything necessary to lose weight. Even when people have the knowledge of what to do, they may hesitate to make behavior changes because of low self-efficacy.

Stotland and Zuroff<sup>121</sup> developed the Dieting Self-efficacy scale which measures three abilities related to weight control: adhering to a diet in eating situations, performing dieting behaviors, and reaching dieting goals. Ratings of self-efficacy for reaching dietary goals were predictive of weight change during participation in a treatment program.

Blair et al.<sup>122</sup> had 100 adults complete self-efficacy measures for weight control behaviors and then monitored their success in losing weight. Self-efficacy for increasing exercise, decreasing alcohol, and cutting down on high-fat snack foods correlated with successful weight loss. Overall, those subjects having the highest self-efficacy were the most successful in losing weight.

Shannon et al<sup>123</sup> assessed self-efficacy before and after participation in a randomized

clinical trial for reducing cholesterol. The subjects were impoverished people living in the rural south. Most subjects were quite confident in their abilities to make dietary behavior changes. Self-efficacy scores were predictive of actual behavior changes in these subjects.

In a study on the food consumption behavior of 242 high school students, Cusatis and Shannon<sup>124</sup> used a measure of self-efficacy for making healthy food choices to predict intake of dietary fat and sugar. Higher self-efficacy scores were associated with eating less sugar and fat. The study showed that other factors such as the pattern of meals and snacks, the consumption of fast food, and conformity to parental wishes were also correlated with fat and sugar intake.

Brug et al<sup>125</sup> assessed attitudes, and self-efficacy beliefs concerning the consumption of fruits and vegetables in 367 adults. Both attitudes -- ideas about the healthfulness of foods, their cost in time and money, and their health consequences — and self-efficacy expectations were associated with the actual intake of fruits and vegetables. The self-efficacy assessment asked subjects to rate their ability to choose fruits and vegetables in a variety of eating situations. Subjects with low self-efficacy beliefs had a very low rate of eating fruits and vegetables in this study.

It would appear that the cognitive variable, self-efficacy, is an important link in the chain of events that leads to making healthy food choices. Unlike restraint and body image, it has been studied in populations other than people trying to lose weight. Across a variety of groups, being confident that you can make dietary changes is a good predictor of behavior change. Conversely, a person with low self-efficacy expectations could not be expected to adhere well to a therapeutic or primary prevention diet. Low self-efficacy expectations appear to be an important cognitive obstacle to adherence.

**Summary of Person Variables .** The literature on eating behavior, eating behavior change, eating disturbances, and dietary compliance supports the conclusion that there are several important sets of variables associated with persons that influence the likelihood someone will make and maintain healthy changes in eating behaviors. Emotional reactions, particularly negative emotions, disrupt dietary adherence for some people. Physiologically, people are influenced by hunger, specific food cravings, and by strong taste preferences, particularly for foods containing fats and sugars. When people begin to restrain their intake of food as a cognitive decision, the result may be positive or it may result in a very unstable pattern of dieting and overeating. A dislike of the size or shape or one's body is an important motivational factor for many individuals, but especially for females. A poor body image, however, is also linked with numerous problems in eating, including eating disorders. Self-efficacy, the confidence that one can successfully make changes in eating behaviors, is an important variable in separating those who will adhere to changes and those who will not.

Most of the evidence linking these variables to good or poor adherence is observational and correlational. In addition, there is evidence that these variables overlap and interact. For example, people with poor body images and high dietary restraint are highly susceptible to emotional eating. There is much work that needs to be done to understand each of these variables individually. At this point, we really have very little systematic and concrete data on how these variables interact with each other. We do conclude that these variables are related to dietary adherence and as such are good candidates for being considered obstacles or barriers to adherence.

## Environmental Barriers to Adherence

**Costs and Economic Resources**. For many products there are now new low-fat alternatives available. In some instances, however, the cost of the reformulated products is higher. Especially for people with low or fixed incomes, the cost of food can be a barrier to making dietary changes. Fresh fruits and vegetables are also sometimes more expensive than some of the foods they might be replacing.

El Kebbi et al<sup>86</sup> interviewed 45 low-income African Americans with NIDDM and asked them to describe some of the barriers to making dietary changes. The cost of low-fat and fat-free foods was one of four main categories of complaints that also included changing habits, social support, and understanding how and why to make changes. The authors suggested that it is possible to revise diet plans and nutrition recommendations so that cost would not be such a great burden.

Lloyd et al<sup>126</sup> investigated obstacles to adopting a low fat-diet in 70 subjects participating in a 20-week intervention. Questionnaires were used to collect data on the actual obstacles encountered during the change period. The most prominent problems mentioned were poor tasting food, an increased cost for food, inconvenience, lack of family support, and difficulty in judging the fat content of specific foods.

Cotunga et al<sup>92</sup>, in an analysis of data from the 1987 National Health Interview Survey, reported that 18% of the population (n=14,064) reported the cost of food as a barrier to making healthy changes in eating. When this was examined by family income, there was a clear trend for this obstacle to be more important in families with moderate and low incomes.

Kirby and colleagues<sup>127</sup> conducted focus groups with 4<sup>th</sup> and 5<sup>th</sup> grade students, their parents, teachers, and food service workers to better understand the determinants of children's fruit and vegetable consumption. While they did not report on the perception of cost, they did show that the availability of fruits and vegetables in children's homes differed significantly by socioeconomic status. This does not rule out the possibility that lower income families could have purchased more fruits and vegetables but choose not to. However, these data are consistent with the idea that low income families have limited resources and hence cannot always afford to follow ideal nutrition guidelines.

Dittus et al<sup>93</sup> surveyed a random sample of 1069 residents of the state of Washington to study perceptions of the benefits and barriers to fruit and vegetable consumption. Their barriers score, which included cost, was significantly associated with socioeconomic status with low income families facing a greater number of barriers. Interestingly, the perceived benefits and concern over susceptibility to cancer did not differ by income level. The authors concluded that cost and other barriers are a more important determinant of behavior than knowledge and attitude.

It seems obvious that people under financial stress will find it difficult to spend more of their precious resources on special or "diet" foods when there are so many other ways they need to spend their money. However, it is likely that perceptions of cost are a barrier even if families that could afford to spend a little more to buy healthier foods.

**Social support**. Social support has been consistently shown to be a protective factor in studies of morbidity and mortality<sup>128-130</sup>. It is usually defined and measured in terms of the number or extent of social contacts and individual has, but is also conceived of as encompassing the quality of interpersonal relationships. Kaplan et al.<sup>131</sup> argue that the epidemiological data on

social support meets the criteria of temporality, strength, consistency, gradient, and biological plausibility and conclude that there is a causal relationship between social support and health. Some theories of how social support reduces disease risk examine the relationship between support and stress<sup>131</sup>. It is also possible that support influences health outcome because it is related to compliance with health promoting behaviors.

Belgrave and Lewis<sup>132</sup> examined the relationship between social support and compliance to health recommendations in 49 African Americans with sickle cell disease and 78 African Americans with diabetes. Social support was a significant predictor of adherence to health recommendations in general, and for diet in particular. Social support was also predictive of appointment keeping, exercise, taking medications, and foot care.

In a study of compliance in 144 diabetics, Heiby et al<sup>133</sup> found a number of situational factors to be related to compliance with several aspects of diabetes self-management, including adherence to diet. Higher levels of social support were associated with better levels of compliance.

In a detailed study of social support and regimen adherence in diabetes, Kaplan and Hartwell<sup>134</sup> followed 86 patients who participated in a diet and exercise program. Social support was measured two ways, perceived satisfaction with social relationships and the size of one's social network. Satisfaction with support was positively correlated with diabetes control for women and negatively correlated with diabetes control for men. Network size was also differentially related to social support as a function of gender.

Foreyt and Goodrick<sup>135</sup> reviewed the literature on weight loss and weight maintenance to identify the factors associated with successful outcome. They found that social support was related to success in losing weight along with self-monitoring, goal setting, and length of treatment. Poor social support and interpersonal conflict was implicated in weight regain.

Marcoux et al.<sup>136</sup> examined social support as a predictor of success in weight control. In general, they found that higher levels of social support were correlated with better weight loss. When asked more specifically about who was providing support, family members of participants were sometimes viewed as supportive and sometimes seen as least helpful. This suggests that the behavior of family members can actually work against adherence if it is not supportive and for adherence if it is.

Black et al.<sup>137</sup> conducted a meta-analysis of 12 studies that compared participant alone versus participant plus spouse weight loss programs. The programs that included couples resulted in larger effect sizes than programs that treated the individual alone. The authors note that in the couples studies, training was often given on how to improve and enhance social support. It is likely that the support of one's spouse improved adherence to a weight loss diet which promoted more successful weight-reduction.

Bovbjerg et al.<sup>138</sup> followed 254 men enrolled in a 24-month dietary intervention trial. The objectives of the study were to lower cholesterol by adopting and adhering to a low-fat diet. Spouse support was not significantly associated with meeting dietary goals at the very end of the 8-week intervention. Spouse support was assessed periodically through the study. Men with high spouse support were 4-5 times more likely to adhere to the study diet than men with low spouse support during the follow-up phases of the study.

In a study of 200 NIDDM patients, Garay-Sevilla and colleagues<sup>139</sup> assessed adherence to diet and medication usage. Higher levels of social support were associated with better adherence to both diet and medication. In addition, they measured different styles of family function and found that compliance was worse in families that had a pattern of rigid control when compared to

families with a relaxed or flexible style of control. Family pattern was also associated with social support with support being lowest in families characterized as chaotic.

Schlundt and colleagues interviewed adolescents<sup>66</sup> and adults<sup>65</sup> with diabetes to learn about how every day situations influenced adherence to dietary recommendations. Situations were described and grouped using a cluster analysis. Two groups of situations involving social support were identified: support from friends and support from families. Also, conflict with peers was another problem situation related to social support that was identified in the adolescent study.

The studies reviewed are only a sample of the studies showing a link between social support and dietary adherence. When family and friends are supportive, either actively or emotionally, adherence is generally better. When support is absent, or when the behaviors of family and friends are unsupportive, adherence tends to suffer. It is very clear that poor social support is a barrier to dietary adherence.

**Food Availability .** It is only logical that one cannot eat healthy foods that are not immediately available. There are many reasons why healthy food items might not be available when one is ready to eat. The lack of availability could be due to poor planning and shopping, due to eating away from home, or because of geographic or cultural reasons.

Jeffery and Wing<sup>140</sup> did an experiment in which they manipulated food availability and examined the effect on weight loss. All subjects received a standard behavior modification for weight loss program and some also were provided with the foods to eat. After 12-months, subjects provided with foods lost more weight than subjects in the behavior modification or behavior modification plus financial incentives groups. Twelve months after the treatment was discontinued, all groups had regained substantial weight and the groups were no longer significantly different. This study suggests that increasing the availability of certain foods promoted better adherence as long as the foods were being provided.

Glanz et al.<sup>141</sup> developed a set of measurement tools to assess the psychosocial factors related to consumption of dietary fat and fiber. Several items assessed the relative availability and ease of eating low-fat, high fiber foods in the workplace. In response to the item, "It's hard for me to get fruits and vegetables when I am at work", 37% of 637 respondents either agreed or strongly agreed. Fifty percent of the subjects disagreed or strongly disagreed to "At my workplace, it is easy to eat a healthy diet".

Taking a more ecological approach, Cheadle and colleague<sup>142</sup> surveyed grocery stores for the availability of healthy foods (i.e., low in fat and high in fiber). A telephone survey was used to establish the consumption of these foods in different communities. There was a positive and significant correlation between the availability of foods in the grocery store and their frequency of consumption in nearby neighborhoods. While availability may be a function of demand from the community, lack of items in the store still creates an obstacle to adherence for people living in that community who are trying to make changes in eating behaviors.

The environmental setting in which one eats has a major impact on the availability of healthy food choices. When eating in restaurants and fast food establishments, the availability of healthy choices may be limited or nonexistent. Schlundt Sbrocco and Bell<sup>68</sup> in their study of dietary slips and relapses in participants in a weight loss program found that overeating was significantly more common in restaurants than at home. Schlundt et al<sup>80</sup> in a detailed analysis of the baseline food diaries of 96 women found that the probability of overeating supper in a restaurant was .45 which can be compared to .29 probability of overeating supper at home.

Schlundt<sup>37</sup> presented a detailed table of probabilities of overeating and impulsive eating along with mean values for calories, and percent of calories from protein, carbohydrate, and fat. This table clearly shows that high-fat, high calorie meals are associated with eating at restaurants.

The data on food availability is somewhat less extensive than for other adherence obstacles. This may be because it seems so obvious that researchers rarely think to ask about it, or there may be other unknown reasons for so little data. The data that does exist supports the idea the healthy foods may be less available in certain settings and that people therefore have more difficulty adhering to their diets in these settings. Clearly finding healthy choices at restaurants and fast food establishments is a challenge for those trying to follow a healthy diet.

**Competing Demands.** Each and every person is faced with the same limitation of only have 24-hours in the day. Often, there are more things we have to do or want to do than we have time for. Competing demands refers to having to make choices between one goal and another since there is often not enough time or resources to pursue both goals. When making choices about diet -- work, family, or community obligations can compete for the time and energy that might be devoted to preparing healthy foods.

Schlundt and colleagues<sup>65-66</sup> interviewed adults and adolescents with diabetes and created a taxonomy of problem situations using cluster analysis. Competing priorities were identified as obstacles to dietary adherence for both adults and adolescents. An example of one of the identified situations is: "Your job has very unpredictable work hours. Often you are forced to eat very late because you had to work late. When this happens, you are starved, your blood sugar gets low, and you are tempted to overeat".

Priorities are dictated by one's values, that is what a person considers to be important. Schwartz and Netta<sup>143</sup> examined the role of values in weight loss. The created an intervention in which one group received what they called "value self-confrontation". When compared to group discussion and not treatment control, the subjects who received the values intervention made changes in their priorities and lost more weight.

Dittus and colleagues<sup>93</sup> constructed a scale to measure barriers to fruit and vegetable consumption that included the item, "It takes too much time for me to prepare fresh vegetables". While there were no separate analysis for this item alone, the barriers scale showed good internal consistency and was the best predictor in this study of actual dietary behaviors.

There has been surprisingly little research on the interface between dietary behaviors and the other priorities people have in their lives. To some degree, the social support data reflects the impact of priorities. When a spouse or family member is not supportive of dietary changes, the individual is often forced to choose between eating healthy and pleasing a spouse or other family member. When this situation arises, we would expect adherence to be poor. We think there is enough data to suggest that competing priorities is an obstacle to dietary adherence.

**Culture .** People from differing cultural backgrounds have different food practices, different beliefs about food, and a different understanding of how food influences their health. A number of authors have written about the need to take culture into consideration when developing measures or interventions dealing with food intake<sup>144-146</sup>. Whether and how cultural factors influence adherence to therapeutic and preventive diets has also been studied.

Fitzgerald et al.<sup>147</sup> administered the diabetes care profile, an assessment of psychosocial factors in diabetes, to 178 patients with NIDDM. The compared the correlations between the diabetes care profile scales and a measure of dietary adherence separately for blacks and whites.

They found that the predictors of adherence differed between the two groups. The authors concluded that the social and cultural functions of food and diet need to be investigated more carefully when developing intervention plans,

Maillet et al.<sup>148</sup> conducted focus groups with African American women who had diabetes and discussed health beliefs, practices, weight loss, and barriers to adherence. The women complained that health providers set unrealistic weight loss goals. They also discussed how being a single mother with children created barriers to dietary self-management and weight loss.

Daniles and colleagues<sup>149</sup> analyzed data from the National Health and Nutrition Examination Survey (NHANES II) and examined compliance with taking blood pressure medication in blacks and whites. There were significant associations between age, education, and gender and medication compliance but once these variables were controlled there was no association between race and compliance. The authors caution investigator and clinicians to be careful about making assumptions that race is the variable that best explains the differences between groups of people. Some apparently racial and cultural differences may instead be a function of education, age, or income.

Wing and Anglin<sup>150</sup> compared the success of white and blacks with NIDDM who participated in a behavioral weight control program. Blacks lost less weight than whites, did not attend sessions as often, and did not comply as well with suggested caloric changes. At the end of the program, blacks regained weight faster than whites. The difficulty in interpreting this study is not knowing what variables to attribute these differences to. It may be physiological differences, differences in compliance, or differences in cultural outlook that are responsible for the differential response to the weight loss program. The research does suggest, however, that a more detailed study of weight loss in African Americans is needed in order to develop programs that will be equally effective as the current ones.

Clark and Emerole<sup>151</sup> discussed differences in cardiovascular risk profiles between blacks and whites in the United States. African Americans tend to have multiple risk factors and clusters of risk factors. The strategies needed for health promotion and prevention may differ between populations because of the differential risk profiles.

In a study of self-care practices of inner city blacks with NIDDM, Skelly et al.<sup>152</sup> administered a battery of questionnaires to 188 patients at two times about 4-5 months apart. They examined which psychosocial variables could predict adherence to diet, blood glucose testing, exercise, and medication. They found that self-efficacy was the single best predictor of adherence at both times. They also found that self-efficacy fluctuated from one time to the next which suggests that the patients had a varying sense of confidence in their abilities.

Other factors implicated in compliance to diet have been studied cross-culturally. There have been numerous studies looking at the prevalence of body image problems, binge eating, and eating disorders in different ethnic and cultural subgroups<sup>153-155</sup>. Margetts et al.<sup>156</sup> Obtained a probability sample of 1000 adults from each of the 14 European Union nations. The survey examined how people define healthy eating in order to see if perceptions of what is healthy vary from one culture to the next. Over 80% of the respondents reported that healthy eating meant consuming less fat and more fruits and vegetables. The methodology, however, was able to identify sub groups that would benefit from targeted nutrition education campaigns.

Steptoe and Wardle<sup>157</sup> studied the relationship between knowledge of health risks, beliefs, and the occurrence of fat avoidance, exercise, smoking, and alcohol intake in eight European countries. There were substantial differences in the frequencies of these health behaviors as a function of culture. Across all the countries, however, those most knowledgeable

of the health risks were more likely to report following a reduced fat diet.

Sanders<sup>158</sup> surveyed 243 low-income Black and Latina residents of Los Angeles to study five health behaviors: sleeping 7-8 hours per night, eating breakfast, exercising 3 time a week, and abstaining from tobacco and alcohol use. There were differences in health behaviors between the Black and Hispanic groups. In addition, health beliefs, exposure to violence, and perceptions of community health care resources were also associated with compliance to these health promoting behaviors.

Hupkens and colleagues<sup>159</sup> compared fat and fiber intake of lower class, middle class, and upper middle class women in three European cities. In two cities, there was a definite trend for the middle and upper middle class women to consume less fat and more fiber. In the third city, there was no difference as a function of social class. The upper middle class women on a lower fat diet appeared to be practicing weight control as evidenced by a smaller intake of bread and potatoes. Working class women ate more meat, milk, and less grains, fruits and vegetables. These data suggested that programs to promote healthy eating needed to be focused on the working classes in two of the cities and on the entire population in the third.

Popkin et al<sup>160</sup> studied trends in healthy eating in American whites and blacks between 1965 and 1991 as a function of social class. In the 1960's American blacks who were poor had a better quality diet than whites of high socioeconomic status. By the 1990's the diet of high socioeconomic class Americans had become much healthier while the diets of low SES blacks and whites had improved somewhat. By the 1990's racial and socioeconomic differences in consumption of dietary fat and fiber had decreased compared to the 1960's. There were still notable race and class differences in diet, and some groups had made changes that were less than favorable. The study illustrates that cultural and socioeconomic variables are not necessarily static over time and that the cultural pressures on eating may be changing.

Thiel and Heinemann<sup>161</sup> compared the eating habits in East and West Germany before and after the collapse of the Berlin wall. Before reunification, there were substantial differences between the two Germanies with people in the East consuming more sausage, butter, and fat and less milk, vegetable oil, fresh vegetables, and fruits than people in the West. An additional survey conducted after the fall of the Berlin wall suggested that food supplies had changed and that the diets of the two Germanies had become more similar with those in the East adopting healthier eating practices.

Dacosta & Wilson<sup>162</sup> examined the eating attitudes and food preferences of three generations of white and black women. There were no significant differences in tendencies towards an eating disorder as a function of either age or race. There were racial differences in culturally preferred foods that spanned the generations. For example, African American women were more likely to prefer fried meats and grits while white women showed a preference for coffee. The author's conclude that African Americans have become socialized into the dominant culture when it comes to eating attitudes related to obesity and weight control, but that some cultural food preferences continue to be passed from one generation to the next.

In a study of three generations of European women, Stafleu et al.<sup>163</sup> administered a nutrition knowledge questionnaire and a food frequency questionnaire to grandmothers, mothers, and their daughters. There were modest, positive correlations between overall nutrition knowledge and knowledge about dietary fat between successive generations. However, the percentage of calories from fat showed no significant correlation between generations. Interestingly, there was no correlation between nutrition knowledge and the percentage of calories from fat in any of the generations. This study shows that knowledge, attitude, and belief

about food and health are shared between successive generations in families supporting the assertion that cultural plays an important role in dietary adherence.

Cultural and economic factors form a larger context within which people understand and follow healthy or unhealthy diets. It seems clear that culture can be an obstacle to adherence, but at this point our understanding of which cultures, which elements of culture, and how these variable influence adherence is limited. More research is needed to come to a better understanding of how to promote healthy eating in different cultural groups.

**Social Interaction**. If eating behavior were regulated by purely biological mechanisms, people would eat the same whether they were alone or with other people. Eating is, however, not only a way to gain sustenance, it is also a social and interpersonal behavior. There are few social rituals that do not involve food or drink. When people get together for just about any reason, more often than not they share a common meal. Is food intake affected by social interactions, and if so do social interactions make it more difficult for people to adhere to therapeutic or preventive dietary plans?

Oygard and Klepp<sup>164</sup> studied 703 young adults between the ages of 23 and 26 years old to understand the influence of social groups on eating behaviors. After examining parents, siblings, partners, friends, and coworkers — partners were found to have the greatest influence of any of these social groups on current eating habits.

Drapkin et al.<sup>165</sup> asked 93 participants in a behavioral weight loss program to respond to four hypothetical eating situations (family celebration, watching television, tension at work, and argument). Quantity and quality of response to the hypothetical situations was predictive of success in losing weight. In addition, perceptions of the difficulty of these situations were predictive of dietary lapses during the program as assessed using telephone interviews. This study suggests that coping with high-risk situations, including those involving social interactions, is an important factor in dietary adherence, at least for those trying to lose weight.

De Castro and colleagues have studied the influence of social interaction and social setting on food intake. In one study<sup>166</sup>, 515 adults kept 7-day food diaries in which they tracked their food intake and many aspects of the eating situation. Meals eaten socially were longer in duration than meals eaten alone. Meals eaten with family were larger and faster while meals eaten with friends were larger and longer than meals eaten alone or meals eaten with other people. The increased amount of time devoted to eating may be responsible for the larger size of social meals. In addition, friends and family may have the effect of producing a relaxation or disinhibition of dietary restraint resulting in a larger than normal food intake. In another study<sup>167</sup> students kept a 3-5 day food diary. On some days, students were instructed to eat their meals alone. On other days, students were instructed to eat their meals with other people, and on other days they were told to eat normally. Subjects ate more food, water, and alcohol at social meals. Food intake was 60% higher when students ate with others as compared to when they ate alone. When 153 subjects kept 7-day food diaries<sup>168</sup>, meal size was found to vary as a function of the number of people present using a power function. When large groups of people ate together, caloric intake was more than 75% larger than when the subject ate alone. In addition, feelings of fullness after the meal increased as a power function of the number of people present. Using diaries from 315 subjects, de Castro<sup>169</sup> showed that this social facilitation effect occurred on both weekdays and weekends. These effects occur even after controlling for time of day, type of meal, the place in which the meal is eaten, and the use of alcohol<sup>170</sup>.

Clendenen and colleagues<sup>171</sup> conducted an experiment in which female subjects were

observed eating a meal alone, with 2 or 4 friends, or with 2 or 4 strangers. Women eating with others, whether friends or strangers, ate more than women eating alone. When eating with friends, subjects ate more dessert than when eating with strangers. This study suggests that the mere presence of other people is enough to encourage greater food intake.

Schlundt and colleagues<sup>68</sup> have looked at the influence of the place in which a meal occurs and the kinds of people present on overeating and impulsive eating. When 35 participants in a behavioral weight loss program kept diaries, the probability of impulsive eating was higher at social events (0.19) especially if the mood was positive (.22) than when the individual was alone (.16), unless they were alone in the car (.19). The effect of other people on impulsive eating was seen to vary as a function of the place in which the eating occurred. For example, the probability that a food intake was unplanned when eating with friends in a restaurant was 0.19 compared to eating with a friend in the car which was 0.36. The effect of social context, and setting on overeating was found to be influenced by mood and by the outcome of the previous eating episode. When subjects had overeaten at the previous meal or snack, the probability of overeating at the present eating episode given they were eating alone was 0.37. The probability of overeating with family in a restaurant was 0.28 while the probability of overeating with family at home was 0.13. There appears to be a social facilitation effect, but it depends upon the other aspects of the eating situation and upon the immediate meal history.

Feunekes et al.<sup>172</sup> observed 50 young adults in eating situations in the natural environment for from 4 to 7 consecutive days. The duration of the meal, the food consumed, ratings of hunger and taste, and the atmosphere of each meal was measured. Meal size was not a function of the number of people present, but was instead a function of the duration of the meal situation. However, the atmosphere of the meal also had an impact on the total amount of food consumed. These data suggest that social interaction increases meal size by creating a positive atmosphere and extending the amount of time during which food is available to eat.

The data on social interaction and eating suggest that people who are trying to restrict or modify their food intake will have more difficulty doing so when they eat in certain social settings and situations. The exact effect may depend upon the number of people present, the relationship to these people, the mood or atmosphere of the situation, the duration of the meal, and the number and size of meals consumed earlier in the day.

## **Conclusion**

There is a growing body of research on the variables that can influence human food intake. Whether intake is measured as calories or macronutrient consumption, whether it is examined in terms of overeating or impulsive eating, and whether eating is assessed by questionnaires or diaries, it is evident that many variables are associated with changes in food consumption. The challenge for an individual who is trying to modify food intake is daunting indeed. It is clearly not a simple matter of having knowledge about what foods to eat, what foods to avoid, and what foods to limit. Eating is a behavior that is sensitive to many psychological, physiological, and environmental influences. The person determined to adopt a healthy eating pattern must regularly face many challenging obstacles that pressure the individual towards eating more food, and eating foods higher in fat and calories.

These finding suggest that a more comprehensive framework for understanding and influencing eating behavior needs to be developed. We have proposed in this paper what an

outline of this framework might look at. Much remains to be learned, however, about the individual variables in our proposed model and especially about how these variables interact.

It is time that investigators abandoned studying how single variables affect food intake in isolation. The research agenda for the future requires that we admit that food intake is a complex and rich behavior, and that we need to find ways to study and understand this complexity. Especially in humans, food intake is both a highly malleable behavior and at the same time a behavior that is difficult to alter fundamentally. Eating practices are adapted to the cultural and micro-environment in which the individual functions on a daily basis. Changing eating practices without making changes in the environment often proves to be quite difficult.

Clinical programs that emphasize the development of competencies and self-efficacy for overcoming the barriers to dietary adherence need to be developed and evaluated. The most important problem that needs to be addressed is how to help people maintain healthy changes in eating behavior over long periods of time. If dietary change is to be an effective primary prevention strategy, then changes have to be substantial and long-lasting.

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## **Appendix B**

# **Obstacles To Breast Cancer Prevention**

## **Structured Interview**

### **Obstacles to Breast Cancer Prevention Interview**

*This interview will focus on some things you might or might not be doing that can help prevent breast cancer. There are no right or wrong answers. We are interested in your thoughts and feelings. Please answer as honestly as possible and know that we will keep your answers confidential.*

#### **Part 1 - Low fat diets**

*There is some evidence that links high fat diets to breast cancer. First, we would like to talk about your diet and in particular about whether or not you are doing anything to try to eat a low fat diet.*

1. Do you ALMOST ALWAYS avoid eating high fat foods? [e.g., butter, margarine, oil, salad dressing, fat meat, fried food, ice cream]

1. NO and I do NOT intend to in the next 6 months
2. NO, but I intend to in the next 6 months
3. No, but I intend to in the next 30 days
4. YES, and I have been, but for LESS than 6 months
5. YES, and I have been for MORE than 6 months

**If answer is #1 then ask questions: 2-9 (pages 1-6)**

**If answer is #2 or #3 then ask questions: 10-14 (pages 7-11)**

**If answer is # 4 or #5 then ask questions: 15-17 (pages 11-16)**

2. Can you tell me in your own words, why you are not interested in adopting a low fat diet?

Give specific examples:

3. Is this something you have ever tried?

No      Yes

4. Have you ever considered trying to lower your fat intake?

No      Yes

5. If yes, when was this and what did you decide.

Give specific examples: _____

6. We would like to understand your thinking a little better. Can you tell use the main reasons why you are not interested in changing your fat intake?

Give specific examples: _____

7. Are there any specific experiences you recall that stand out as influential in your choice to reject the idea of following a low fat diet?

Give specific examples: _____

8. Was your lack of interest in a low fat diet influenced by family support? If yes, how was your decision influenced?

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by too difficult to do?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by financial concerns/costs?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by habits and family traditions?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by taste and preference for specific foods?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by distrust of medical information?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by the time or effort that would be involved?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by not liking to make changes?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by being under too much stress?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by your job or the place you work?**

Give specific examples: _____

**Was your lack of interest in a low fat diet influenced by being too busy?**

**Give specific examples:** \_\_\_\_\_


**Was your lack of interest in a low fat diet influenced by your health?**

**Give specific examples:** \_\_\_\_\_


**Was your lack of interest in a low fat diet influenced by the way lowfat foods make you feel?**

**Give specific examples:** \_\_\_\_\_


**Was your lack of interest in a low fat diet influenced by not being sure it is necessary to eat a low fat diet?**

**Give specific examples:** \_\_\_\_\_


**Was your lack of interest in a low fat diet influenced by eating away from home or at restaurants?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a low fat diet influenced by lack of knowledge about low fat eating?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a low fat diet influenced by your attitude towards lowfat foods?**

Give specific examples: \_\_\_\_\_

9. **Can you think of any other reasons why you have decided not to change your diet by lowering your fat intake?**

Give specific examples: \_\_\_\_\_

10. Since you think you would like to change your diet in the future, can you tell me in your own words why you are NOT currently following a low fat diet?

Give specific examples: \_\_\_\_\_


11. Can you identify one or two things that makes it hard for you to actually make these changes.

Give specific examples: \_\_\_\_\_


12. Have you ever tried to follow a low fat diet in the past.

No      Yes

13. Can you think of any reasons that you find it hard to change because of lack of family support. Be specific or give an example if you can.

Give specific examples: \_\_\_\_\_


Can you think of any reasons that you find it hard to change because it is too difficult to do?

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to change because of financial concerns/costs?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of habits and family traditions?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of taste and preference for specific foods?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of distrust of medical information?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of the time or effort that would be involved?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to change because of not liking to make changes?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to change because of being under too much stress?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to change because of your job or the place you work?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to change because of being too busy?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to change because of your health?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to change because of being not sure it is necessary to follow a low fat diet?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to change because of eating away from home or at restaurants?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to change because of lack of knowledge about low fat eating?**

Give specific examples: \_\_\_\_\_

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**Can you think of any reasons that you find it hard to change because of your attitude towards lowfat foods?**

Give specific examples:	_____
	_____
	_____
	_____

14. **Can you think of any other reasons why you are not currently lowering your fat intake?**

Give specific examples:	_____
	_____
	_____
	_____

15. **As you have tried to follow a low fat diet, you may have encountered some situations in which it has been hard to stick with it. Can you give me some examples of situations that make it hard to stick to a low fat diet?**

Give specific examples:	_____
	_____
	_____
	_____

16. **Can you think of any reasons that you find it hard to stick to a low fat diet because of family support? Be specific or give an example if you can.**

Give specific examples:

**Can you think of any reasons that you find it hard to stick to a low fat diet because of too difficult to do?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to stick to a low fat diet because of financial concerns/costs?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to stick to a low fat diet because of habits and family traditions?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to stick to a low fat diet because of taste and preference for specific foods?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to stick to a low fat diet because of distrust of medical information?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of the time or effort that would be involved?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of not liking to make changes?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of being under too much stress?**

Give specific examples:	_____
	_____
	_____

---

**Can you think of any reasons that you find it hard to stick to a low fat diet because of your job or the place you work?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of being too busy?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of your health?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of the way lowfat foods make you feel?**

Give specific examples:	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of being not sure it is necessary to follow a low fat diet?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of eating away from home or at restaurants?**

Give specific examples: _____

**of Can you think of any reasons that you find it hard to stick to a low fat diet because of lack knowledge about low fat eating?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to stick to a low fat diet because of attitude towards lowfat foods?**

Give specific examples: _____

17. **Can you think of any other things that make it hard for you to stick with it?**

Give specific examples: _____

## Part 2 - Five or more servings of fruits and vegetables

*There is some evidence that eating more fruits and vegetables may help prevent breast cancer. First, we would like to talk about your diet and in particular about whether or not you are doing anything to try to eat a lot of fruits and vegetables.*

1. Do you ALMOST ALWAYS eat five or more servings of fruit or vegetables each day?

1. NO and I do NOT intend to in the next 6 months
2. NO, but I intend to in the next 6 months
3. No, but I intend to in the next 30 days
4. YES, and I have been, but for LESS than 6 months
5. YES, and I have been for MORE than 6 months

**If answer is #1 then ask questions: 2-9 (pages 17-22)**

**If answer is #2 or #3 then ask questions: 10-14 (pages 23-27)**

**If answer is # 4 or #5 then ask questions: 15-17 (pages 28-31)**

2. Can you tell me in your own words, why you are not interested in increasing your intake of fruits and vegetables?

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

3. Is this something you have ever tried?

No      Yes

4. Have you ever considered trying to eat more fruits and vegetables?

No      Yes

5. If yes, when was this and what did you decide.

Give specific examples: _____

6. We would like to understand your thinking a little better. Can you tell use the main reasons why you are not interested in changing your intake of fruits and vegetables?

Give specific examples: _____

7. Are there any specific experiences you recall that stand out as influential in your choice to reject the idea of increasing your intake of fruits and vegetables?

Give specific examples: _____

8. Was your lack of interest in a diet high in fruits and vegetables influenced by family support? If yes, how was your decision influenced?

Give specific examples: _____

to      **Was your lack of interest in a diet high in fruits and vegetables influenced by too difficult do?**

Give specific examples: _____

**Was your lack of interest in a diet high in fruits and vegetables influenced by financial concerns/ costs?**

Give specific examples: _____

**Was your lack of interest in a diet high in fruits and vegetables influenced by habits and family traditions?**

Give specific examples: _____

**Was your lack of interest in a diet high in fruits and vegetables influenced by taste and preference for specific foods?**

Give specific examples: _____

**Was your lack of interest in a diet high in fruits and vegetables influenced by distrust of medical information?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by the time or effort that would be involved?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by not liking to make changes?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by being under too much stress?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by your job or place you work?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by being too busy?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by your health?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by how lowfat foods make you feel?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by not sure it is necessary to follow a diet high in fruits and vegetables?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by eating away from home or at restaurants?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by lack of knowledge about low fat eating?**

Give specific examples: \_\_\_\_\_

**Was your lack of interest in a diet high in fruits and vegetables influenced by your attitude towards lowfat foods?**

Give specific examples: \_\_\_\_\_

9. **Can you think of any other reasons why you have decided not to change your diet by eating more fruits and vegetables?**

Give specific examples: \_\_\_\_\_

10. Since you think you would like to change your diet in the future, can you tell me in your own words why you are NOT currently eating five or more servings of fruits and vegetables each day?

Give specific examples: \_\_\_\_\_

Give specific examples: _____

11. Can you identify one or two things that makes it hard for you to actually make these changes.

Give specific examples: \_\_\_\_\_

Give specific examples: _____

12. Have you ever tried to eat five servings of fruits or vegetables each day?

No      Yes

13. Can you think of any reasons that you find it hard to change because of family support? Be specific or give an example if you can.

Give specific examples: \_\_\_\_\_

Give specific examples: _____

**Can you think of any reasons that you find it hard to change because of too difficult to do?**

Give specific examples: \_\_\_\_\_

Give specific examples: _____

**Can you think of any reasons that you find it hard to change because of financial concerns/costs?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of habits and family traditions?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of taste and preference for specific foods?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of distrust of medical information?**

**Give specific examples:** \_\_\_\_\_

that **Can you think of any reasons that you find it hard to change because of the time or effort would be involved?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of not liking to make changes?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of being under too much stress?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of your job or the place you work?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of being too busy?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of your health?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of the way lowfat foods make you feel?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of not sure it is necessary to follow a low fat diet?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of eating away from home or at restaurants?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of lack of knowledge about low fat eating?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of your attitude towards lowfat foods?**

Give specific examples: \_\_\_\_\_

14. **Can you think of any other reasons why you are not currently eating five or more servings of fruits or vegetables each day?**

Give specific examples: \_\_\_\_\_

15. As you have tried to eat a diet that includes many fruits and vegetables, you may have encountered some situations in which it has been hard to stick with it. Can you give me some examples of situations that make it hard to eat a diet high in fruits and vegetables?

Give specific examples: \_\_\_\_\_


16. Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of family support. Be specific or give an example if you can.

Give specific examples: \_\_\_\_\_


Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of too difficult to do?

Give specific examples: \_\_\_\_\_


Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of financial concerns/costs?

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of habits and family traditions?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of taste and preference for specific foods?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of distrust of medical information?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of the time or effort that would be involved?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of not liking to make changes?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of being under too much stress?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of your job or the place you work?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of being too busy?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of your health?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of how fruits and vegetables make you feel?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of not sure it is necessary to follow a low fat diet?**

**Give specific examples:** \_\_\_\_\_

---

---

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of eating away from home or at restaurants?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of the lack of knowledge about low fat eating?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick to a diet high in fruits and vegetables because of your attitude towards lowfat foods?**

Give specific examples:	_____
	_____
	_____
	_____

17. **Can you think of any other things that make it hard for you to eat a diet high in fruits and vegetables?**

Give specific examples:	_____
	_____
	_____
	_____

### Part 3 - Breast Self-examinations

*Women who practice regular breast self-examinations are more likely to catch breast cancer early when it can be easily treated.*

1. **Do you perform a breast self-examination once a month to make sure you do not have cancer?**

1. **NO and I do NOT intend to in the next 6 months**
2. **NO, but I intend to begin in the next 6 months**
3. **No, but I intend to begin in the next 30 days**
4. **YES, and I have been, but for LESS than 6 months**
5. **YES, and I have been for MORE than 6 months**

**If answer is #1 then ask questions: 2-9 (pages 32-36)**

**If answer is #2 or #3 then ask questions: 10-14 (pages 36-41)**

**If answer is # 4 or #5 then ask questions: 15-17 (pages 41-44)**

2. **Can you tell me in your own words, why you are not interested in breast self-examination to screen for breast cancer?**

Give specific examples: \_\_\_\_\_

_____
_____
_____

3. **Is this something you have ever tried?**

No      Yes

4. **Have you ever been shown or taught how to examine your breasts for lumps and changes?**

No      Yes

5. **If yes, when was this and why did you decide not to practice it regularly?**

Give specific examples: \_\_\_\_\_

_____
_____

6. We would like to understand your thinking a little better. Can you tell me the main reasons why you are not interested in breast self-examination?

Give specific examples: \_\_\_\_\_


7. Are there any specific experiences you recall that stand out as influential in your choice to reject the idea of breast self-examination?

Give specific examples: \_\_\_\_\_


8. Was your decision influenced by family support? If yes, how was your decision influenced?

Give specific examples: \_\_\_\_\_


**Was your decision influenced by the fact that it is too difficult to do?**

Give specific examples: \_\_\_\_\_


**Was your decision influenced by feeling uncomfortable, don't like to touch yourself?**

Give specific examples: \_\_\_\_\_


**Was your decision influenced by fear that you might find something?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by distrust of medical information or doctors?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by the time or effort that would be involved?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by feeling too anxious?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by not knowing how to do a breast self examination?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by not remembering to do it?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by too much stress in your life?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by what the doctor told you?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by your attitude toward Cancer?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by it not seeming important?**

Give specific examples: \_\_\_\_\_

9. **Can you think of any other reasons why you have decided not to examine your breasts regularly?**

Give specific examples: \_\_\_\_\_


10. **Since you think you would like to start doing breast self-examinations in the future, can you tell me in your own words why you are NOT currently doing it?**

Give specific examples: \_\_\_\_\_


11. **Can you identify one or two things that makes it hard for you to actually make these changes.**

Give specific examples: \_\_\_\_\_


12. **Have you ever tried to examine your breasts on a regular basis in the past?**

No      Yes

13. **Can you think of any reasons that you find it hard to change because of family support? Be specific or give an example if you can.**

Give specific examples: \_\_\_\_\_

---

---

Can you think of any reasons that you find it hard to change because of it being too difficult to do?

Give specific examples: \_\_\_\_\_

Can you think of any reasons that you find it hard to change because of financial concerns/costs?

Give specific examples: \_\_\_\_\_

Can you think of any reasons that you find it hard to change because of feeling uncomfortable, don't like to touch yourself?

Give specific examples: \_\_\_\_\_

Can you think of any reasons that you find it hard to change because of fear that you might find something?

Give specific examples: \_\_\_\_\_

---

---

**Can you think of any reasons that you find it hard to change because of distrust of medical information or doctors?**

Give specific examples:	_____
	_____
	_____
	_____

**that      Can you think of any reasons that you find it hard to change because of the time or effort would be involved?**

Give specific examples:	_____
	_____
	_____
	_____

**anxious?      Can you think of any reasons that you find it hard to change because of feeling too anxious?**

Give specific examples:	_____
	_____
	_____
	_____

**to      Can you think of any reasons that you find it hard to change because of not knowing how to do a breast self examination?**

Give specific examples:	_____
	_____
	_____
	_____

to  
**Can you think of any reasons that you find it hard to change because of not remembering do it?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of too much stress in your life?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of distrust of medical information or doctors?**

**Give specific examples:** \_\_\_\_\_

**that Can you think of any reasons that you find it hard to change because of the time or effort would be involved?**

**Give specific examples:** \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of feeling anxious?**

Give specific examples: \_\_\_\_\_

**to** **Can you think of any reasons that you find it hard to change because of not knowing how to do a breast self examination?**

Give specific examples: \_\_\_\_\_

**to** **Can you think of any reasons that you find it hard to change because of not remembering to do it?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you find it hard to change because of too much stress in your life?**

Give specific examples: \_\_\_\_\_

**14. Can you think of any other reasons why you are not currently examining your breasts for lumps or changes at least six time a year?**

Give specific examples: \_\_\_\_\_

15. As you have tried to practice breast self-examination, you may have encountered some reasons which make it hard to stick with it. Can you give me some examples of reasons that make it hard to stick to breast self-examination?

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

16. Can you think of any reasons that you find it hard to stick breast self-examination because of family support? Be specific or give an example if you can.

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

of Can you think of any reasons that you find it hard to stick breast self-examination because too difficult to do?

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

of Can you think of any reasons that you find it hard to stick breast self-examination because financial concerns/costs?

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of feeling uncomfortable, don't like to touch yourself?**

Give specific examples: \_\_\_\_\_

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of fear that you might find something?**

Give specific examples: \_\_\_\_\_

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of distrust of medical information or doctors?**

Give specific examples: \_\_\_\_\_

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of the time or effort that would be involved?**

Give specific examples: \_\_\_\_\_

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of feeling too anxious?**

Give specific examples:	_____
	_____
	_____
	_____

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of not knowing how to do a breast self examination?**

Give specific examples:	_____
	_____
	_____
	_____

of      **Can you think of any reasons that you find it hard to stick breast self-examination because of not remembering to do it?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to stick breast self-examination because of too much stress in your life?**

Give specific examples:	_____
	_____
	_____
	_____

17. **Can you think of any other things that make it hard for you to stick with it?**

Give specific examples: \_\_\_\_\_

## Part 4 - Mammogram

*Doctors recommend that women have mammogram done in order to see if they have breast cancer. Each woman should have a baseline mammogram by age 40.. From ages 40 and up, an annual mammogram is recommended.*

- 1. Are you currently following the recommendations for mammogram that are appropriate for your age. (Check and make sure the person understands what she should be doing according to the guidelines).**
  - 1. NO and I do NOT intend to in the next 6 months**
  - 2. NO, but I intend to begin in the next 6 months**
  - 3. No, but I intend to begin in the next 30 days**
  - 4. YES, I have had one mammogram**
  - 5. YES, I have had a mammogram for 2 consecutive years**

**If answer is #1 then ask the follow questions: 2-9 (pages 45-49)**

**If answer is #2 or #3 then ask questions:10-14 (pages 49-54)**

**If answer is #4 or #5 then ask questions:15-16 (pages 54-58)**

- 2. Can you tell me in your own words, why you are not interested in mammogram to screen for breast cancer?**

Give specific examples:

- 3. Have you ever had a mammogram?**

No      Yes

- 4. Do you know what to do to have a mammogram done?**

No      Yes

5. We would like to understand your thinking a little better. Can you tell use the main reasons why you are not interested in following the recommendations for mammogram?

Give specific examples:	_____
	_____
	_____
	_____

6. Are there any specific experiences you recall that stand out as influential in your choice to reject the idea of regular mammogram?

Give specific examples:	_____
	_____
	_____
	_____

7.. Was your decision influenced by family support? If yes, how was your decision influenced?

Give specific examples:	_____
	_____
	_____
	_____

Was your decision influenced by Feeling uncomfortable having it done/ embarrassment?

Give specific examples:	_____
	_____
	_____
	_____

Was your decision influenced because of fear that you might find something?

Give specific examples:	_____
	_____
	_____
	_____

**Was your decision influenced by lack of money or health insurance to pay for it?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by the time or effort that would be involved?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by not understanding the benefits?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by too much stress in your life?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by not remembering to do it?**

Give specific examples: \_\_\_\_\_

**Was your decision influenced by the doctor not recommending it?**

Give specific examples: _____

**Was your decision influenced by no transportation to clinic?**

Give specific examples: _____

**Was your decision influenced by your fear of Cancer?**

Give specific examples: _____

**Was your decision influenced by your belief that the procedure is unnecessary?**

Give specific examples: _____

**Was your decision influenced by the fear of pain?**

Give specific examples: _____

**Was your decision influenced by fear of radiation?**

Give specific examples: _____

**Was your decision influenced by the quality of available health resources?**

Give specific examples: _____

8. Can you think of any other reasons why you have decided not to have regular mammogram?

Give specific examples: _____

9. Since you think you would like to start having mammogram done in the future, can you tell me in your own words why you are NOT currently doing it?

Give specific examples: _____

10. Can you identify one or two things that makes it hard for you to actually make these changes.

Give specific examples: _____

11. **Have you ever had a mammogram the past?**

No      Yes

12. **Can you think of any reasons that you have never had a mammogram because of Family Support? Be specific or give an example if you can.**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you have never had a mammogram because of feeling uncomfortable having it done/ embarrassment?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you have never had a mammogram because of fear that you might find something?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you have never had a mammogram because of lack of money or health insurance to pay for it?**

Give specific examples: \_\_\_\_\_


**Can you think of any reasons that you have never had a mammogram because of the time or effort that would be involved?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you have never had a mammogram because of not understanding the benefits?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you have never had a mammogram because of too much stress in your life?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you have never had a mammogram because of not remembering to do it?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you have never had a mammogram because of the doctor not recommending it?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you have never had a mammogram because of no transportation to clinic?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you have never had a mammogram because of the fear of Cancer?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you have never had a mammogram because of belief that the procedure is unnecessary?**

Give specific examples: \_\_\_\_\_

**Can you think of any reasons that you have never had a mammogram because of fear of pain?**

Give specific examples: _____

**Can you think of any reasons that you have never had a mammogram because of fear of radiation?**

Give specific examples: _____

**Can you think of any reasons that you have never had a mammogram because of the quality of available health resources?**

Give specific examples: _____

13. **Can you think of any other reasons why you are not currently following the recommendations for mammogram?**

Give specific examples: _____

14. As you have tried to get a mammogram done regularly, you may have encountered some reasons which make it hard to stick with it. Can you give me some examples of reasons that make it hard to schedule a mammogram?

Give specific examples: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

15. Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of family support? Be specific or give an example if you can.

Give specific examples: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of feeling uncomfortable having it done/ embarrassment?

Give specific examples: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of fear that you might find something?

Give specific examples: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of lack of money or health insurance to pay for it?**

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of the time or effort that would be involved?**

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of not understanding the benefits?**

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of too much stress in your life?**

Give specific examples: \_\_\_\_\_

_____
_____
_____
_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of not remembering to do it?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of the doctor not recommending it?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of no transportation to clinic?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of fear of cancer?**

Give specific examples:	_____
	_____
	_____
	_____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of the belief that the procedure is unnecessary?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of fear of pain?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of fear of radiation?**

Give specific examples: _____

**Can you think of any reasons that you find it hard to make a regular appointment to get a mammogram because of the quality of available health resources?**

Give specific examples: _____

16. **Can you think of any other things that make it hard for you to schedule a mammogram?**

Give specific examples: \_\_\_\_\_


## DEMOGRAPHIC DATA

1. How old are you? \_\_\_\_\_

2. What is your height.

Height: \_\_\_\_\_ feet \_\_\_\_\_ inches

2A. BMI: \_\_\_\_\_

3. How much do you weigh in pounds? It is critical for our evaluation that your weight be as accurate as possible.

Weight: \_\_\_\_\_

4. What grade are you in? If you are not currently in school, what was the highest grade you completed (check one)?

Primary school (grade 1 through 6) \_\_\_\_\_

7th-8th grade \_\_\_\_\_

9th-11th grade \_\_\_\_\_

12th grade, high school graduate \_\_\_\_\_

Some college \_\_\_\_\_

College graduate \_\_\_\_\_

Graduate of professional school \_\_\_\_\_

5. Please mark your level of income per family member:

\$10,000-\$20,000 \_\_\_\_\_

\$20,000-\$30,000 \_\_\_\_\_

\$30,000-\$40,000 \_\_\_\_\_

\$40,000 and above \_\_\_\_\_

## **Appendix C**

### **Obstacles to Adherence Coding System**

## **Obstacles to Adherence Coding System**

The purpose of this system is to code and classify the reasons or explanations people give for being unable to adhere to medical, health, behavioral, or preventive recommendations.

The system is used in two stages. In the first stage, an individual's self-report is reviewed and subdivided into discrete explanatory statements. These statements need not be whole sentences or phrases, but instead represent the occurrence of a single explanation for adherence difficulties.

Consider the following example.

When I eat lunch at work, the only place to eat is the cafeteria and they cook the food their with a lot of fat and grease. I could get a salad, but I am usually so hungry by lunch time that I go ahead a get a whole plate of food, even though I know it's high in fat.

There are 4 explanations in this statement

1. at work, the only place to eat is the cafeteria
2. they cook the food with a lot of fat and grease
3. I could get a salad, but I am usually so hungry by lunch time that I go ahead and get a whole plate of food
4. I get a whole plate of food even though I know it's high in fat

Note that the phrase "I get a whole plate of food" contributed to two different ideas in this description. This is allowed as long as you can separate the sentences and descriptions into distinct ideas. Some words and phrases can contribute to more than one idea.

The second stage involves placing each idea into one of the categories of the coding system. The coding system is hierarchically organized. You first decide which major category the explanation belongs in, then search for a sub category within that major category. If there are further subcategories, you continue until you find a category that best fits the explanation.

You then record your result on the coding sheet. A separate coding sheet should be prepared for each interview you code. Be sure to complete all the sections of the coding sheet so that the characteristics of the subject can be associated with the number and kind of reasons given.

- 1.0 Psychological Explanations - Psychological explanations attribute adherence problems to some aspect of the person, her psychological make up, her emotions, or her physiological and metabolic needs and responses. Consider whether the explanation is referring in some way to a state, reaction, property, or predisposition of the self. If it does, then the response is coded as a psychological explanation.
  - 1.1 Emotional explanations. Emotional explanations attribute adherence problems to a feeling state.
    - 1.1.1 Feeling trigger – An emotional state triggers or stimulates a behavior that is incompatible with adherence.

- 1.1.1.1 Negative emotional trigger – The feeling is negative or an unhappy such as a feeling of anger, sadness, anxiety, or depression.
- 1.1.1.2 Fear trigger - being afraid or what might happen or what consequence might occur leads to failure to adhere or selection of an incompatible behavior instead. If no specific source of the fear is described or can be reasonably inferred from the context, then code it as a negative emotional trigger. This category is to be used with a specific fear event or outcome is identified.
- 1.1.1.3 Positive emotional trigger – The feeling is a positive or happy feeling such as a feeling of happiness, joy, satisfaction, or excitement.
- 1.1.1.4 Boredom emotional trigger – the feeling described that triggers an incompatible behavior is boredom.
- 1.1.1.5 Deprivation emotional trigger – a feeling of being deprived triggers an incompatible behavior.
- 1.1.2 Feeling consequence – An emotional state occurs as a consequence of the adherence behavior or of an incompatible behavior and this consequential feeling is the obstacle.
  - 1.1.2.1 Negative emotional consequence – adhering provokes negative feelings like depression, anger, anxiety, or sadness.
  - 1.1.2.2 Positive emotional consequence – a nonadherent behavior has a positive mood state as its consequence such as feeling happy, satisfied, or comforted.
  - 1.1.2.3 Embarrassment - Performance of the behavior leads to feelings of embarrassment.
  - 1.1.2.4 Guilt or shame – the person anticipates that choosing to adhere would result in feelings of guilt or shame.
- 1.2 Personality trait explanations – the reason for nonadherence attributed to a stable personality factor or trait.
  - 1.2.1 Personality trait laziness – the failure to adhere is attributed to laziness
  - 1.2.2 Other personality trait – the failure to adhere is attributed to a stable personality trait or characteristic
- 1.3 Physiological explanations – the reason for not adhering to recommendations has to do with a physical state or symptom
  - 1.3.1 Cravings – the person describe having a craving for a particular food or type of food. Cravings may also refer to a taste such as sweet or salty.
  - 1.3.2 Hunger – the physical state of hunger is described as the reason for not being able to adhere.
  - 1.3.3 Pain trigger – physical aches and pains trigger an incompatible behavior.
  - 1.3.4 Pain consequence – the consequence of adhering is aches and pains. These can include headaches, stomach aches, muscle cramps, or feelings of tenderness or discomfort.
  - 1.3.5 Health – the anticipated effect of adherence on one's health is negative or is insufficiently positive. The state of one's health might be such that it prevents the individual from adhering.
- 1.4 Cognitive explanations - A thought or idea is described as a reason for being unable to adhere to recommendations.

- 1.4.1 Thoughts as triggers – a thought or idea triggers a behavior that is incompatible with adherence
  - 1.4.1.1 I failed – the idea that one failed or somehow did not live up to implied or explicit standards provides an opportunity or excuse to engage in incompatible behavior.
  - 1.4.1.2 Lack of confidence - the behavior was not performed or another behavior was chosen instead because of a lack of confidence that one could effectively or successfully carry out the behavior.
  - 1.4.1.3 Difficulty – the action is perceived as too difficult or beyond one's ability or skill.
  - 1.4.1.4 Lack of knowledge or information – the behavior is not selected because the individual does not have sufficient knowledge or information necessary to perform the behavior.
  - 1.4.1.5 Other thoughts – another kind of thought or style of thinking is described that triggers incompatible behaviors.
- 1.4.2 Thoughts as consequences - a thought or idea occurs or is anticipated to occur as a consequence of adherence and the person chooses not to adhere in order to avoid thinking this thought or having this idea.
  - 1.4.2.1 Negative self-evaluation – adhering to recommendations would result in a negative evaluation or appraisal of one's self such labeling one's self stupid, a failure, childish, etc.
  - 1.4.2.2 Loss of pride or self-esteem. Choosing to adhere is anticipated to result in a change of mind about one's self that effectively is a loss of pride or self-esteem.
  - 1.4.2.3 Not liking to change – choosing to adhere would involve making a change in one's habits or routines. The individual expresses the idea that she does not like to make changes and this is the reason she cannot adhere.
  - 1.4.2.4 Unsure of benefits. The individual does not choose the behavior because she is unsure of what benefits might occur from doing so. This category may also be used when the individual knows what the benefit are, but is unsure that the benefits are powerful or worthwhile.
- 2.0 Environmental explanations - The reason for not being able to adhere to recommendations is external to the self and resides somewhere in the environment.
  - 2.1 Financial – the inability to adhere is attributed to money or finances
    - 2.1.1 Poverty – a general statement is made that one is too poor or lacks the financial resources to be able to adhere to recommendations
    - 2.1.2 Specific costs - the inability to adhere is attributed to the high cost of an item, service, medication, food etc.
    - 2.1.3 Competing costs – an obligation to spend money on something else prevents one from adhering to the recommendations.
  - 2.2 Family – the inability to adhere is attributed to some aspect of the individual's family situation or to the behavior of family members.
    - 2.2.1 Emotional support – a lack of emotional support from family members is cited. Emotional support involves behaviors like giving encouragement, providing comfort, expressions of sympathy or empathy.
    - 2.2.2 Tangible support – a lack of tangible support is cited as the reason for nonadherence. Tangible support involves performing specific tasks that

would make it easier to follow medical advice or to practice preventive behaviors.

- 2.2.3 Conflict – the performance of a behavior would create a conflict, disagreement, argument, or heated discussion with another family member.
- 2.2.4 Sabotage – the actions or lack of actions on the part of family members sabotages the individual's attempts to adhere to recommendations. The actions may vary from trying to talk the person out of it .
- 2.2.5 Family tradition – the behavior would violate a norm of family behavior or somehow go against family traditions. Family here can mean both immediate family and extended family.
- 2.2.6 Family demands – the action could not be done because the level of demands for time, energy, effort, or attention from family members was too high or got in the way. Use this category whenever a person describes having to make a choice between adherence and the needs or demands of family life.

2.3 Work – The lack of adherence is attributed to some aspect of the person's work, school, or career activity.

- 2.3.1 Work demands – the demands of work are too high in terms of time, energy, attention, or effort to allow the person to be adherent.
- 2.3.2 Work environment – there is something about the work environment that interferes with or prevents adherence
  - 2.3.2.1 Actions of coworkers - The behaviors and attitudes of coworkers prevent or impede adherence.
  - 2.3.2.2 Rules of workplace – the rules of the workplace do not allow the time or the freedom to adhere.
  - 2.3.2.3 Resources of workplace – the resources in the workplace are such that it makes it difficult or impossible to adhere.
  - 2.3.2.4 Other aspect of work – there is some other aspect of the working or school environment that prevents adherence.

2.4 Home environment – some aspect of the home environment does not allow or encourage adherence.

- 2.4.1 Resources – there is a lack of resources at home. This could mean that foods are not available to eat, or that the utensils needed to prepare the foods are not there. It could mean that there is no place to store foods, or that a piece of equipment is broken or malfunctioning.
- 2.4.2 Space – there is not enough room at home either due to overcrowding and a lack of privacy or due to the cramped nature of the living quarters.
- 2.4.3 Other aspect of home – there is some other aspect of the home environment that prevents adherence.

2.5 Community – the inability to adhere is attributed to some aspect of the community in which the individual lives. Living in a community can be both a matter of proximity, the geographic area in which you live, and a matter of identification, the people you see as similar to yourself. Identification communities can be defined in many ways including income, education, religion, and race.

- 2.5.1 Travel and transportation – the lack of access to transportation of the distances that must be traveled are a barrier to adherence.
- 2.5.2 Resources – there is something lacking in the community in terms of resources needed in order to facilitate adherence.

2.5.2.1 Restaurants – the foods one should eat are not available in restaurants

2.5.2.2 Fast food – fast food establishments do not sell healthy foods

2.5.2.3 Groceries – the kinds of foods one needs are not available at grocery stores

2.5.2.4 Medical resources – medical services are not readily available in the community.

2.5.3 Health beliefs , practices, and traditions – the cultural beliefs, health behaviors, and traditions of the community in which one lives are barriers to adherence.

2.5.3.1 Religious traditions – the religious beliefs of one's peers or peer group create problems for adherence

2.5.3.2 Social events – attending social events in one's community creates a problem for adherence. This might include ball games, parties, school events, church socials, or getting together with neighbors and friends.

2.5.3.3 Social sanction – the individual anticipates criticism or social sanction from peers if she were to adhere to recommendations

2.5.3.4 Folk beliefs – the individual describes an idea or belief in the community that is not an established part of medical science yet is a way of understanding, explaining, preventing or treating medical problems. Use of many alternative therapies, faith healing, and cures based on attitude would fall into this category.

2.5.3.5 Attitudes towards medicine – the individual expresses a cultural belief or attitude towards medicine, doctors, or the medical establishment that prevents or impedes adherence. An example is the idea that doctors are only interested in making money, or drug companies cannot be trusted, or public health officials are all telling lies.

2.6 Interpersonal – the individual describes interpersonal situations not involving family members that create adherence difficulties

2.6.1 Social facilitation – the people one is with or around are engaging in incompatible behaviors and this makes it difficult or impossible to adhere to recommendations.

2.6.2 Conflict – choosing to adhere creates or is anticipated to create interpersonal conflict.

2.6.3 Lack of social support - the behavior of others in a social situation is creating a lack of social support, either active or emotional.

## **Obstacles to Adherence Coding System**

Subject ID \_\_\_\_\_

Education \_\_\_\_\_

Coder \_\_\_\_\_

Age \_\_\_\_\_

Income \_\_\_\_\_

Date \_\_\_\_\_

Height \_\_\_\_\_

Method \_\_\_\_\_

Weight \_\_\_\_\_

Number	Code	Low-fat	Fruit & Veg	BSE	Mammography
1.1.1.1	Negative emotional trigger				
1.1.1.2	Fear trigger				
1.1.1.2	Positive emotional trigger				
1.1.1.4	Boredom trigger				
1.1.1.5	Deprivation trigger				
1.1.2.1	Negative emotional consequence				
1.1.2.2	Positive emotional consequence				
1.1.2.3	Embarrassment				
1.1.2.4	Guilt or shame				
1.2.1	Laziness – personality trait				
1.2.2	Other personality trait				
1.3.1	Cravings				
1.3.2	Hunger				
1.3.3	Pain trigger				
1.3.4	Pain consequence				
1.3.5	Health				
1.4.1.1	I failed				
1.4.1.2	Lack of confidence				
1.4.1.3	Difficulty				
1.4.1.4	Lack of knowledge				
1.4.1.5	Other thoughts				
1.4.2.1	Negative self-evaluation				
1.4.2.2	Loss of pride or self-esteem				
1.4.2.3	Not liking to change				
1.4.2.4	Unsure of benefits				
2.1.1	Poverty				
2.1.2	Specific costs				
2.1.3	Competing costs				
2.2.1	Emotional support				
2.2.2	Tangible support				
2.2.3	Family conflict				
2.2.4	Sabotage				
2.2.5	Family tradition				
2.2.6	Family demands				
2.3.1	Work demands				
2.3.2.1	Actions of coworkers				
2.3.2.2	Rules of workplace				
2.3.2.3	Resources of workplace				
2.3.2.4	Other aspects of work				
2.4.1	Resources at home				
2.4.2	Space				
2.4.3	Other aspect of home				
2.5.1	Travel and transportation				
2.5.2.1	Restaurants				
2.5.2.2	Fast food				
2.5.2.3	Groceries				
2.5.2.4	Medical resources				
2.5.3.1	Religious traditions				
2.5.3.2	Social events				
2.5.3.3	Social sanction				
2.5.3.4	Folk beliefs				
2.5.3.5	Attitudes towards medicine				
2.6.1	Social facilitation				
2.6.2	Interpersonal Conflict				
2.6.3	Lack of social support				